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PURE RESEARCH AND PRACTICAL RESEARCH

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The financial support of pure research is an insurance premium paid by society as a protection against stagnation. Pure research needs no more justification than does play. The research investigator is permitted to study any problem his fancy selects, and no one has substantial grounds for criticism of his selection. All that can be required of him is that he show high standards of careful scholarship in the study and solution of his selected problem. If he attacks the investigation in a scholarly manner he satisfies himself and gains the approval of his colleagues.

Pure research may be considered from the point of view either of the research worker or of society. From the individual research worker's point of view its only standard of evaluation is the satisfaction that it gives him. From the point of view of society its practical and social value is to be considered. If pure research is protected and encouraged, society is often repaid for the outlay. Here and there some principle, fact, or solution is discovered in the course of the research game which may prove of significant importance to society. And these results might possibly never have been discovered if some child of research had not happened upon them in his play. It frequently happens that what originally was of use only to give satisfaction to the research worker becomes a powerful method for controlling the needs, desires, and satisfactions of society. When Benjamin Franklin, for instance, played with his kite and his key the neighbors might well have smiled at his childish and impractical curi-

osity, yet these objects of derision have become a cornerstone of recent civilization and have given us electric lights, street railways, the automobile, the radio, and thousands of articles of commerce now listed as social necessities. Franklin and his colleagues, the pure research workers, will always be protected as long as the leaders of society possess ordinary wisdom.

"Pure research, therefore, consists of two steps: it attacks any problem anywhere that appeals to the fancy of the investigator. If he desires to investigate the composition of the stones in the gall-bladder of a South Sea Island turtle, he has an inalienable right to do so." Then when he has selected his problem all that is demanded of him is that he apply scholarly methods to its solution. When he has done this and published his findings for the use of other investigators who may be interested in them his task is completed. "He need feel no concern about whether or not his findings have any practical social use for the layman."

"When, however, we enter the field of practical research, the situation becomes much more complicated. The practical research investigator cannot pick his problems from the air. They are localized within practice and in the end they must again be applied to the improvement of practice." His selection is narrowed by the practical situations in which he works.

The practical research worker must also be protected and nourished by society. His contribution, study by study, is socially more valuable than is that of the pure research worker. His batting average is higher. He also works for the love of the game, but he cannot indulge in those wide gestures of selection which accompany untrammeled freedom.

Practical research workers are growing in numbers and power as their contributions are realized to be valuable beyond computation. They cannot with justice be derided by the pure research worker. They use the same careful technique and often discover startlingly important new methods and facts which, indeed, are quite as often as not used by the pure research worker.

Practical research interestingly enough increases the two steps of pure research to five. The distinction between the tech-

nique of the two types of worker is of so much importance to practical research that an analysis of the distinction is quite worth making. It is of importance to practical research because the recruits who enter that field from pure research often do not recognize the greater exactions of practical research and so are frequently unsuccessful.

In practical research the first of the five steps is a study of an activity, a running organization, a going concern, to see where it fails to function, and the final objective is to improve the practical activities of the organism or agency studied. For instance, before beginning practical research in the department-store field it is necessary as a first step to make an analysis of department-store practices and find the points at which the store fails to function as a distributor of merchandise. When this analysis is made it immediately breaks up into the functions of the different types of employees. There it is discovered that the salesman, the delivery man, the accountant, the buyer, and the manager, may each fail to function adequately. The problem to be selected for investigation must be one of these. Or, again, as a second illustration, we have the bakeries, whose business it is to provide bread which will possess the highest possible standards of nutriment and at the same time meet the approval of the consumer with respect to appearance and other qualities. Here again the problem selected by the practical research worker for study in this field must lie within the field of bread-making. The practical research worker's selection of a problem is limited by the practical situation within which practice works.

As a second step practical research selects some one of these problems for study in the laboratory. In the department-store field, for instance, he may select the improvement of selling as his specific problem for research, and in the baking field he may be assigned to the problem of making a bread that will completely sustain life and at the same time will satisfy the traditions and fancies of the consumer. Specifically, it may be the problem of discovering a bread which, while it will sustain life as the single article of diet, will have the proper color, appearance, and consistency to be popular with the public.

After the problem has been selected, practical research takes it into the laboratory and by careful methods of scholarship seeks to obtain a thoughtful and adequate solution. Again in the department-store field this means that analysis will be made of the points at which the salesman fails to be a good salesman, and when these difficulties have been discovered the best methods of handling them will be collected from the literature, from experimental studies, and from the practical experience of expert salespeople. The material so collected will be organized into teaching form. Specifically, when such a study was made the results were worked up into a book of about four hundred pages, and in the baking field a bread was discovered through years of experiment which contained all the elements adequately to sustain life.

At this point where the labors of the pure research worker would end, the troubles of the practical research worker are just beginning. For after the solution has been worked out installation becomes necessary. The practical research worker must still see to it that his solution is practical and that it will improve the conduct of the organization for which he has worked it out. In the department-store field the textbook prepared was given to the salespeople, but it was found that they would not read it. The fault was not in lack of interest in the style, but rather in the bulk. The salespeople were not used to reading big books. In the baking field it was found that the consumers would not buy the bread, because they did not like the color. It was brown, when they preferred to eat white bread.

It is at this point that the pure research worker who enters this field has to watch himself carefully. When he has spent a great deal of time upon working out what seems to him to be an entirely adequate solution and finds that the solution will not be used by the people concerned, his instinctive reaction is to lay the blame upon the user. He may, in moments of discouragement, talk about the lack of intelligence of the consumers and let the matter rest there, but the practical research worker has only one course open to him, and that is to lay the blame upon

his solution, for a solution that will not be used will not improve practice, and therefore is a failure up to this point.

For the practical research worker the step of installation is crucial. When he finds that his idea will not work he must modify its form until he finds one that will be used. For instance, in the department-store field: when it was discovered that the large book would not be read by the salespeople, the material was restudied, thrown into a new form, and shortened. Instead of the ordinary textbook form the material was organized around sixty-five questions, for which the answers were given in as simple language as possible, and the four hundred pages were cut to eighty. This material was then given to the salespeople to read, and again they would not read it. So it was finally decided that instead of distributing it to the salespeople for reading at home it should be taught in classes. The salespeople were brought to the training department at stated intervals, and the book was read in class under the direction of a teacher. When these things had been done, the salespeople acquired the desired information, and it was felt that the step of installation had been completed. In the baking field, the research worker had to take his bread back into the laboratory and discover some means of retaining the elements which he had found were necessary to sustain life and yet would give the bread the color which would meet the fancy of the consumer. This study took several years to complete.

It is obvious that the more experience the practical research worker has with the practical situation, the more likely is the third step—the original solution in the laboratory—to be successful, and that the wiser he becomes the less difficult is the step of installation. His first solution is more likely to be the practical one.

Young research workers who study in the field of education and have had all their training under the conditions of pure research are prone to fail in their work because of their inability to handle this step of installation. It is extremely difficult for them to realize when they have spent a great deal of time in

working out a solution that it may not be usable by the school teacher and the administrator in practice. Instinctively they feel that the fault cannot lie with them since they have worked so carefully upon the solution and know it is good. But they fail to realize the fact that as practical research workers, they have to take the abilities, the attitudes, and the habits of the school worker into account in their solution as part of the problem rather than merely isolate a problem and solve it without consideration of ability of the workers to use it when completed. To get this point of view frequently means a complete revolution in their attitude and methods of thinking.

After the installation has been successfully accomplished it then becomes necessary to reduce it to routine so that practice will be permanently improved. It often happens that the new solution is enthusiastically received by the workers, but it is not used long enough to become a habit, with the result that while practice is temporarily improved, the results are not permanent. Consequently the machinery has to be set up for making the solution a part of the organization. To continue our illustration of the department store: it was found that the salespeople were taught the technique of selling in class until the whole store was covered, but that six months later the new salespeople who had entered the organization in the natural course of labor turn-over, were not being given the benefit of this material. In consequence, it became necessary to adjust the course in the training department so that after salespeople had been in the store for six weeks and were likely therefore to be relatively permanent members of the organization, they should be brought to the training department and put through the course. When this had been accomplished it was felt that the practical research problem had been solved, especially when the selling ability of the salespeople, measured at intervals over some length of time, was seen to be improving.

This description throws into relief the distinction between pure research and practical research. Pure research has only two steps. First, a problem may be selected from any source,

and second, a scholarly and careful solution must be found. In practical research there are five steps. (1) *A going concern is studied,* measurements made, and points of weakness discovered. (2) Some one of these weaknesses is *selected* for investigation. (3) Then follows *solution in the laboratory.* (4) This is succeeded by the step of *installation* in which modifications must be made so that the solution will work in practice. (5) Finally, the solution must be *maintained* by placing it into the organization so that it will become a permanent part of the system. The pure research worker must, upon entering the practical research field, never lay the blame for the lack of use of his solution upon the organization. It is absolutely essential that he consider the failure to use it to be a failure in his solution, and he must seek to make the necessary changes and set up the proper routine to secure its permanent use.

THE INCIDENCE OF UNDESIRABLE BEHAVIOR IN PUBLIC-SCHOOL CHILDREN

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In November 1916, the College of Education of the University of Minnesota in cooperation with the Medical School opened a clinic for the mental and educational examination of children. The management of the clinic was placed in the hands of a committee representing the Department of Educational Psychology, the Department of Pediatrics, and the Department of Mental and Nervous Diseases. From the first the Department of Sociology cooperated by assigning graduate students to the study of cases. Other clinical departments of the Medical School cooperated according to the nature of the cases. This arrangement has continued to the present time although the personnel of the committee has frequently changed.

From the first the clinic has been interested in the behavior problems of children, as may be seen from the first published announcement[1] of the clinic's program. At least three of the ten types of children there listed may be classed under the general group of "behavior" children with which this paper is concerned. As a matter of fact, the initial day of the clinic's operation was signalized by the examination of a fourteen-year-old boy who was on parole from an industrial school where he had been committed by the juvenile court for persistent truancy accompanied by minor infractions of the law. Our records show him to have been a border-line case as to intelligence, to have come from a feeble-minded mother, a border-line father, and to have had two feeble-minded sisters, all of whom, with himself, had come to Minneapolis through the United States Immigration Bureau several years before. The family showed a record of economic dependency in the community and a history of school disturbance.

[1] *The Psycho-Educational Clinic.* Minneapolis, University of Minnesota, 1917. Leaflet. (Bulletin of the University of Minnesota, Vol. XX, No. 49, General Series No. 58.)

The boy soon entered the class of serious violators of the law through a theft of considerable magnitude.

Expansion of the Program

This boy is of historical interest to our clinic because of certain recent developments in regard to juvenile delinquency. The National Committee for Mental Hygiene, supported by a subvention from the Commonwealth Fund, has within the past two years conducted demonstration clinics in a number of American cities for the study of juvenile crime and the related behavior problems in children. One of these demonstrations under the name of the Child Guidance Clinic was operated at the University of Minnesota from October, 1923, to October, 1924. In the conduct of the demonstration clinic the interested social, educational, and correctional agencies of both Minneapolis and St. Paul joined, and the work of the University Clinic was for the time limited, a large part of its work being delegated to the visiting organization.

A Search for Behavior Problems

It is the purpose of this paper to relate in some detail a study conducted by our local clinic in cooperation with the visiting Child Guidance Clinic in one of the public schools of Minneapolis during the year 1923-24. The stream of behavior children which day by day flows through a child guidance clinic suggests to any careful observer two things: first, that in our school population there are a far larger number of behavior children than most of us would have believed, and, second, that the variety of behavior symptoms ranges through many forms. Some of these children manifest undesirable reactions very early; and there is a growing belief that we must take seriously these early behavior disorders if we would prevent the dreadful toll which crime and insanity in their more serious forms levy upon our oncoming generations.

It was with a view to finding the incidence of early behavior symptoms that the present project was undertaken. The entire

school population of a large district was surveyed by a method outlined by the writer and Mr. E. K. Wickman, psychologist in the Child Guidance Clinic. This school, which is located in one of the better industrial districts of a large city, is composed of eight elementary grades and special classes for the subnormal, and for sight-saving. The more than eight hundred pupils were housed in a modern building and had for several years been under the direction of an excellent principal and a professionally minded corps of teachers. The school is one in which the College of Education has for a number of years done considerable intelligence and educational testing, and about which we already possessed much valuable information.

The survey project was in two parts and drew upon the teacher's knowledge of the children for a record of their behavior difficulties. First of all, each teacher was asked to catalogue, according to a schedule provided, the frequency of occurrence of undesirable behavior in the life of each child in her room so far as such behavior had come to the teacher's knowledge. In the second part, each teacher was asked to rate on five-point scales the several children in her room as regards their standing on each of a list of 37 traits. Prior to using the two schedules, all the teachers in the building were instructed in their use by Mr. Wickman and some initial practice was given. The teachers returned records for approximately 800 pupils according to each of the schedules.

Schedule One

We shall be here concerned with analysis of results from the first schedule only, which began with a blank for the pupil's name, followed by this direction:

> Below is a list of behavior problems sometimes found in children. Will you please place a check (X) after each item in the appropriate column to designate how frequently such behavior has occurred *in your experience with this child?* A check should appear in some column after each item.

There were then listed sixteen types of undesirable behavior and spaces were provided for record in each of four degrees

of frequency of occurrence as follows: "has never occurred," "has occurred once or twice but no more," "occasional occurrence," and "frequent occurrence." The items of undesirable behavior were listed in this order: stealing; cheating; lying; imaginative lying; truancy; unnecessary tardiness; defiance to discipline; unpopularity with children; bullying; marked overactivity; speech difficulties; temper outbursts; masturbation actually known; masturbation suspected; obscene notes, talk, or pictures and disinterest in school work.

Before attempting to interpret the teachers' returned records it will be well to recognize certain limitations of such reports in order that we may be chary about over-assurance as to their significance. Let us admit at once that not all of the facts asked for are objectively determinable, and that about many of them there hovers a large halo of subjectivity. Stealing and speech difficulties are facts about the existence of which there will be little disagreement but disinterest in school work may be exhibited through a wide range of overt acts which to some teachers will seem sufficiently serious to make a matter of record and which to others will appear negligible. It must be further admitted that some of the traits are more easily observable than others and that the list may be unduly weighted for or against one or the other sex. Let us grant also that the exciting cause for undesirable behavior on the part of children is sometimes the teacher herself who falls short of complete adaptation to the school situation. Again it may be granted that many of the children who are credited with conduct of an a-social or anti-social kind will outgrow their undesirable tendencies in the ordinary course of their growth and schooling.

With these concessions granted it remains true that the record which a teacher made for a particular child represented her judgment as to the appearance or non-appearance of the several types of behavior in that child during her experience with him. That her record in a particular case was in danger of being weighted with a large personal equation, with her frailty in judging, and at times with unconscious prejudice may be admitted.

That each of the teachers honestly tried to give a faithful record of the facts there is good reason to believe and our data must be accepted for just that and no more.

Frequency of Behavior Problems

With due humility invoked by these requisite concessions as to the validity of our data let us now proceed to the analysis of the records. For the eight hundred children the results appear in Table I which gives the frequency for each problem on a three-level scale.[2] Behavior of an undesirable character appeared more or less frequently in 51 percent of the entire group of pupils.[3] As might have been anticipated *Disinterest in school work* shows the highest frequency and it is closely followed by *Cheating, Unnecessary tardiness,* and *Lying,* while the more serious matters of *Stealing, Masturbation, Truancy,* and *Obscenity* appear the fewest times but still with sufficient frequency to excite concern not merely to the investigator but to the school authorities as well.

The table also reveals that the teachers' judgments of undesirable behavior are often based on knowledge of a single act rather than upon its repetition, about one-third of all acts being credited with one occurrence. For convenience these may be designated as one-level problems, an occasional frequency may be called "two-level" problems, and an act marked as of frequent occurrence a "three-level" problem. The percent of all behavior problems falling at each level is as follows: one-level problems, 31.3 percent; two-level problems, 33.3 percent; and three-level problems, 34.4 percent.

Undesirable behavior is rendered more serious not merely by the frequency of its occurrence but by its appearance along with

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[2] For the statistical work on the records the writer is indebted to Mr. W. C. Olson, assistant in the Bureau of Educational Research.

[3] V. V. Anderson records the following percents:

Conduct Disorders	6.2 percent
Speech Disorders	6.1 percent
Nervous and Psychopathic Cases	3.5 percent
Personality Defects	32.0 percent

The difference in categories does not admit of direct comparisons. See *Report of Mental Hygiene Survey of Cincinnati.* Cincinnati, Mental Hygiene Council of the Public Health Federation, 1922. pp. 62-67.

other forms of undesirable behavior in the same individual.[4] Disinterest in school work even though persistent may not be difficult to cure; but if it is accompanied by cheating, unnecessary tardiness, and defiance to discipline, it becomes a far more seri-

TABLE I. FREQUENCY OF OCCURRENCE OF SEVERAL TYPES OF UNDESIRABLE BEHAVIOR

Types of Undesirable Behavior	Number of Children Reported at Each Level of Occurrence				Total Occurrence
	Has Never Occurred	Has Occurred Once or Twice but No More	Occasional Occurrence	Frequent Occurrence	
Disinterest in school work	628	56	73	44	173
Cheating	660	84	42	15	141
Unnecessary tardiness	675	62	38	26	126
Lying	677	77	24	23	124
Defiance to discipline	714	40	29	18	87
Marked over-activity	726	14	27	34	75
Unpopular with children	[illegible]	23	18	22	63
Temper outbursts		18	24	10	52
Bullying	752	15	21	13	49
Speech difficulties	760	10	8	23	41
Imaginative lying	772	17	7	5	29
Stealing	779	13	4	5	22
Masturbation, suspected	780	9	6	6	21
Truancy	782	7	8	4	19
Obscene notes, talk, or pictures	792	5	1	3	9
Masturbation, actually known	795	0	1	5	6

ous matter. Because of this it seemed desirable to devise a scheme of combination and weighting by which each child would be given a behavior score.

Computing the Behavior Score

In determining the weight to be given an item, a method based on the frequency of occurrence was used. It was assumed that a frequently reported act was less a-social than one of rarer occurence, because it represented a less serious deviation from ac-

[4] Mr. R. J. Mayo found that a serious social problem was created only when three factors combined in one point. Unpublished thesis, *Relation between School Problem and Social Problem.*

cepted behavior. No allowance could be made for the fact that certain acts are more open to observation than others are. By this weighting scheme[5] the following types of behavior are given a weighting of 1: disinterest in school work; cheating; unnecessary tardiness; lying; defiance to discipline; marked overactivity.

TABLE II. DISTRIBUTION OF BEHAVIOR SCORES FOR SEVEN HUNDRED AND SIXTY CASES[a]

Score	Frequency	Score	Frequency
0	376	56– 59	2
4– 7	124	60– 63	3
8–11	53	64– 67	0
12–15	58	68– 71	3
16–19	28	72– 75	3
20–23	23	76– 79	2
24–27	20	80– 83	2
28–31	14	84– 87	2
32–35	12	88– 91	3
36–39	6	92– 95	0
40–43	8	96– 99	1
44–47	9	100–103	0
48–51	3	104–107	0
52–55	3	108–111	2
		Total	760

[a] Forty-one cases with incomplete records are omitted from the above tabulation.

A weighting of 2 was given to: unpopularity with children; temper outbursts; bullying; speech difficulties; imaginative lying.

A weighting of 3 was given to: stealing; masturbation suspected; truancy, obscene notes, talk, or pictures; masturbation known.

These weighting divisions are in part arbitrary but they coincide approximately with the size of the standard deviation if the distribution of frequencies is regarded as the symmetrical half of a normal frequency curve.

It was necessary in addition to weighting the act for its seriousness also to weight the level of its manifestation. An act

[5] This weighting is probably not that which corresponds to the ethical values of the several acts. It rather represents the degree of social variation, modified as indicated by ease of observation of the act in question.

appearing once or twice was given a rating of four, an occasional appearance was rated six, and a frequent appearance seven, these weights corresponding approximately to the ratios between the frequencies at each of the three levels.

The behavior score was calculated by combining the weighting for the seriousness of the act with the weighting credited to the degree of appearance. To illustrate: John Jones stole. This act is weighted three. He did it frequently which gives a weight

TABLE III. RELATIONSHIP BETWEEN BEHAVIOR SCORES AND CHRONOLOGICAL AGE

Chronological Age	Average Scores	
	Boys	Girls
6	10.4	5.1
7	17.1	4.2
8	6.1	4.4
9	11.9	6.8
10	10.5	6.5
11	15.1	7.3
12	13.3	6.1
13	9.9	8.7
14	6.6	4.9
15	5.4	5.8
16		4
17		0

of seven. The behavior score is made by multiplying three by seven, giving a score of 21. A child's total behavior score was merely the addition of his scores for the several items of behavior.

By this technique a behavior score was calculated for each of the 800 pupils reported (Table II). With a behavior score determined for each child it becomes possible to study the incidence of behavior problems in terms of age, grade, sex, intelligence, and of the teacher in charge.

Behavior, Age, and Sex

The resulting behavior scores when related to age (Table III and Figure 1), reveal that no single period of development is characterized by any large proportion of behavior problems. There is, to be sure, a slight swelling of the figures from eleven

to twelve years which confirms the current acceptance of the stormy nature of puberty. There is, however, no year without pronounced evidence of behavior difficulties.

The data of Table III and the corresponding facts pictured in Figure 1 confirm another common belief, namely, that boys rather than girls present the larger number of behavior situations. This is true at every age up to 15 years, after which the number of boys in school is negligible.

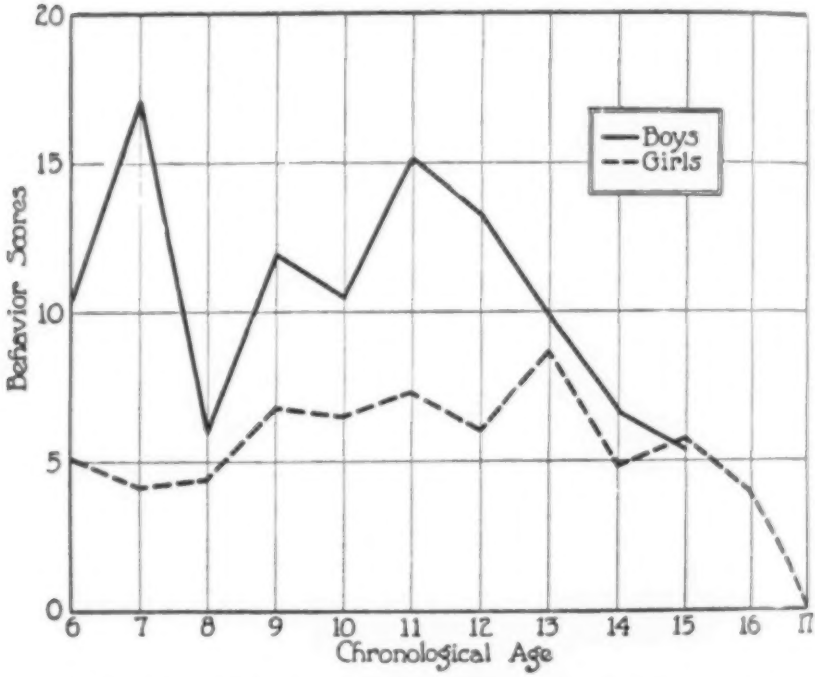

FIGURE 1. RELATIONSHIP BETWEEN BEHAVIOR SCORES AND CHRONOLOGICAL AGE

In thus interpreting these figures it is well to bear in mind that the forms of undesirable behavior studied here may be those more easily detected in boys than girls and that a more adequate means of identification might alter these apparent tendencies by bringing to light undesirable acts peculiar to girls. The fact

that as many women as men enter insane asylums suggests that the figures given here do not tell the whole story.

Behavior, Age, and Grade

The fairly uniform distribution of behavior scores throughout the several years suggests that no grade will be free from behavior problems, and this inference is confirmed by the facts

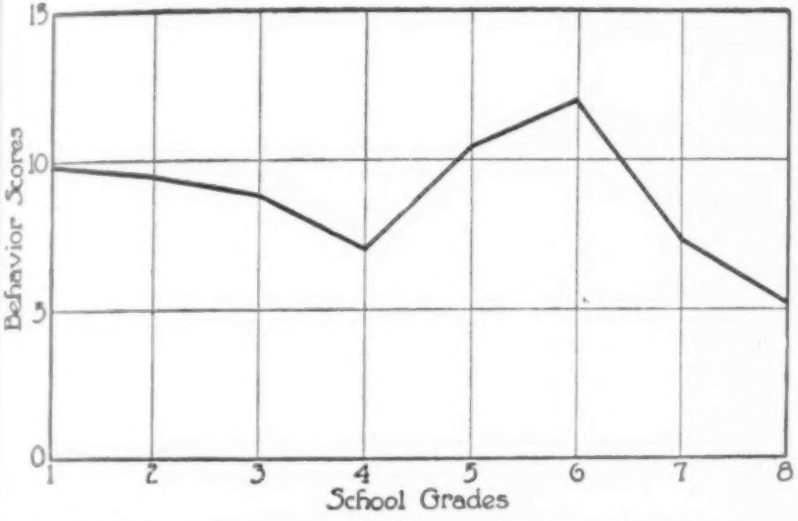

FIGURE 2. RELATIONSHIP BETWEEN BEHAVIOR SCORES AND GRADE IN SCHOOL

shown in Figure 2. The scores when tabulated in a Strayer-Engelhardt Age-Grade Table (Table IV, Figure 3) reveal that the children who are making the most rapid progress through school present the fewest behavior problems. The average score for the 77 pupils of this group is 5.9 while it is 6.6 for the 443 normal pupils and 14.7 for the over-age or retarded group of 202 pupils. The high incidence for the retarded group occurs in spite of a particularly low behavior score for grade VIII. Everywhere except in this grade the over-age group displays an abnormally large amount of undesirable behavior.

The meaning of these figures is not altogether clear. It may be that the school, while failing to carry these pupils through its program at the normal rate, is at the same time surrounding them with conditions peculiarly conducive to the development of socially undesirable behavior. It may be that the scholastic and other demands placed upon them are in themselves the exciting causes of a-social conduct and that the mitigation of these demands might improve the situation and render possible a more

TABLE IV. RELATIONSHIP BETWEEN BEHAVIOR SCORES AND AGE-GRADE STATUS

Classification	Grade								All
	I	II	III	IV	V	VI	VII	VIII	
Under age									
Number	0	11	10	7	14	10	13	12	77
Total Score	0	84	22	28	84	86	67	86	457
Average	0	7.6	2.2	4	6	8.6	5	7.2	5.9
Normal									
Number	100	81	62	44	48	27	55	26	443
Total Score	854	583	367	217	324	216	215	128	2,904
Average	8.5	7.2	5.9	5	6.7	8	3.9	4.9	6.6
Over age									
Number	16	25	35	15	27	16	39	29	202
Total Score	280	440	556	220	520	332	497	130	2,975
Average	17.5	17.6	15.9	14.7	19.3	20.7	12.7	4.5	14.7
All									
Number	116	117	107	66	89	53	107	67	722
Total Score	1134	1107	945	465	928	634	779	344	6,336
Average	9.8	9.5	8.8	7	10.40	12	7.3	5.2	8.8

adequate social adaptation. It may be that these pupils are the victims of a school organization and curriculum designed for their benefit but the exacting demands of which force upon them defensive reactions classed by their teachers as socially undesirable.

Behavior and Intelligence

Upon this question some further light is thrown by the study of behavior scores in relation to intelligence. The quotients used in the study are derived from the Haggerty Intelligence Exami-

nations Delta 1 and Delta 2.* Since all comparisons are based on median quotients they may be accepted as satisfactory for our present purpose. Using Terman's classification of intelli-

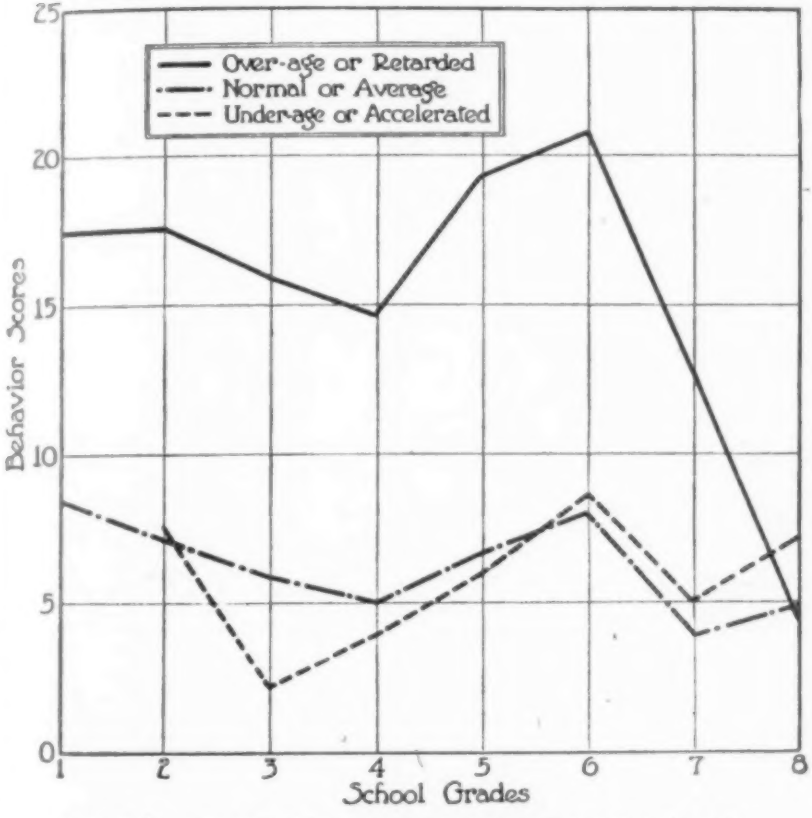

FIGURE 3. RELATIONSHIP BETWEEN BEHAVIOR SCORES AND AGE-GRADE STATUS

gence levels it becomes possible to calculate the mean behavior score for each degree of intelligence (Table V).

A gradual increase in the behavior score is evident as the level of intelligence moves downward. Beginning with a score

*Data are available for 486 of the 801 cases.

of 5 for the *very superior* group the score grows in magnitude successively for the *superior, normal, dull,* and *border-line* cases and reaches its maximum of 36 for *definite feeble-mindedness.* A striking exception to this order occurs at the other extreme of intelligence where the five pupils of intelligence quotients of 140 or more exhibit a higher behavior score than any group excepting the dull, border-line, and feeble-minded.

The obvious tendency for behavior problems to increase at both ends of the scale of intelligence is probably to some degree significant of the less satisfactory adaptation of the school to these extremes of ability. Were it possible to lay the entire responsibility for behavior problems on the school, it would appear

TABLE V. MEAN BEHAVIOR SCORE MANIFESTED BY EACH LEVEL OF INTELLIGENCE ACCORDING TO TERMAN'S CLASSIFICATION OF INTELLIGENCE QUOTIENTS

I. Q.	Classification	Behavior Score	Number of Cases
Above 140	Near genius or genius	7.4	5
120–140	Very superior	5.0	62
110–120	Superior	6.5	87
90–110	Normal	7.2	236
80– 90	Dullness	13.5	62
70– 80	Border-line	14.6	27
Below 70	Definite feeble-mindedness	36.1	7

to meet the needs of the very superior group best of all and to serve the geniuses about as well as it does the normal children. Such complete assumption of responsibility by the school is hardly justified, however.

If we disregard the degree of seriousness in the undesirable behavior and consider only the percent of children who exhibit such behavior, then the normal children would seem to be adapting best. Figure 4 shows that the percent of undesirable behavior is lowest at 100 I. Q. and rises rapidly with variation in either direction, although most rapidly toward the lower end of the intelligence scale. In the case of the more intelligent children the data show that a high behavior score is due to the greater frequency of the less serious forms of behavior. A high

score in the other direction is usually due to the presence of the more serious acts as well as to their greater frequency.

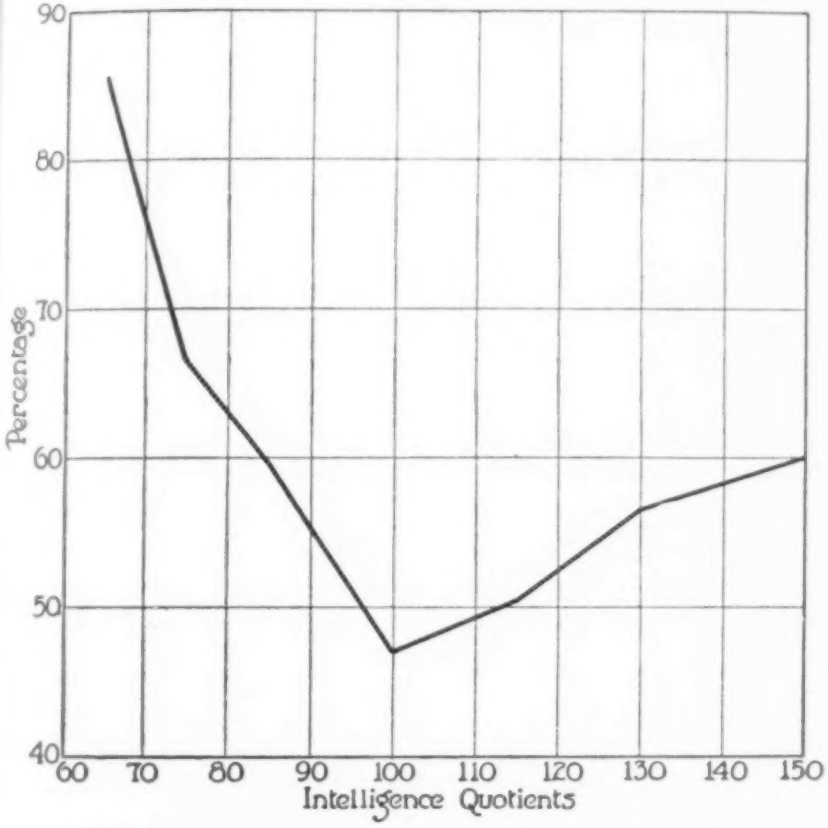

FIGURE 4. PERCENT OF CHILDREN MANIFESTING BEHAVIOR PROBLEMS AT DIFFERENT LEVELS OF INTELLIGENCE

Behavior, Intelligence, and Retardation

We have already noted the greater incidence of undesirable behavior among the retarded pupils. We may now connect with this phenomenon the fact that in every grade these are the children of lowest intelligence. Our data give no clear revelation of causal relations among these several components of the situ-

ation. Thier concomitancy is, however, perfectly clear. Over age and retardation, low intelligence, and undesirable behavior, these three-fold factors in perplexing combination face every teacher in the school studied. How far the means at her disposal make possible an adequate solution of her problem it is not possible to say.

The capital-letter expression of this unholy trinity was found in the subnormal room where 93 percent of all pupils were rated as behavior problems and where the average behavior score was 47.

The case of John

The meaning of one of the higher behavior scores may be made concrete by the psychologists' detailed analysis of the case. A boy in the second half of the first grade whom we may call John has a score of 43. This boy has a good intelligence (mental age, 7 years 4 months; intelligence quotient, 105). He shows excellent ability to work with his hands. The mental age indicates adequate ability to meet the intellectual requirements of his grade and to make normal progress in school. Physically he is in good health at present with the exception of some carious teeth.

"John is always doing what he isn't supposed to do." His teacher thinks he is the worst boy in the room. He talks almost continuously and will interrupt anyone. Instead of being in his seat, he is usually at the teacher's desk to tell her something unimportant. He bothers the children about him. He is a "smarty," always plays for attention, and makes queer noises with his mouth. He never stays in line. He likes to fight and tease. Once he took a chocolate bar from a boy's coat pocket. He is self-sufficient and always blames someone else for his shortcomings. His school life is described as unhappy. His overactivity and extravagant, "smarty" behavior are disliked by both teacher and pupils and he has fallen into disrepute among them. When John is asked to name the "bad" boys in his class, he heads

the list by himself, and thus corroborates the teacher's statement. He arranges this list identically with that given by the teacher.[7]

There are a number of factors in school which contribute to this maladjustment. His particular class has been a problem group since its entry into kindergarten. All the teachers who have had the group indicate this, and add that it is the "worst" class they ever had. As a consequence all the children have been unfavorably conditioned both in their school work, and in general school behavior. Their present teacher, who is nervous and not in the best of health, says she dislikes the room very much and is so dissatisfied she wants to give up teaching. She has never had such a room in her twelve years of teaching experience. It happens, also, that in this group there are four nervous, over-active children—all maladjusted to school and playing for attention—who are the source of much school disturbance. These four over-active children are constantly setting each other off in an almost continuous round of excitement. This condition serves as a further stimulant to nervousness and over-activity. John says in examination he doesn't like school, doesn't like his teacher, and doesn't like the work.

The list of disturbing forms of behavior was supplemented by a visit to his home where he was said to be "restless, talkative, and impulsive." There are many evidences of nervousness: nail biting, stuttering, finicky appetite, talking in his sleep. He is impatient and easily angered; is forward and cannot be embarrassed. When there is company in the home he takes that time to go through the house and upset everything. John frequently takes pennies from his father's pockets. He has always been a hard child to manage.

The detailed analysis of this boy's case required many hours of time on the part of the physician, the psychologist, and the social worker. When completed it showed that John had been "a nervous child from birth" and that this "hyperkinesis" was apparently a constitutional condition. There are evidences of

[7] It is an interesting observation that four children studied in this room place themselves in the correct order of the teacher's affection—all at the bottom of the scale. John says "She likes me worst."

instability on both sides of the family. A paternal aunt had a nervous breakdown; and two others are nervous, excitable, impatient, and irritable. The maternal grandmother was impatient and quick-tempered. John was a sickly, fussy baby. "He never slept through an entire night." Evidences of nervousness still persist. He talks in his sleep, is fussy about his meals, stutters, and bites his nails. He sucked his thumb until recently. This condition has been aggravated by physical ill-health; rickets until two and a hernia from early infancy. A year ago he had a siege of measles, pertussis, and diphtheria, and immediately following he had tonsillotomy and herniotomy performed.

John's hyperkinesis was evident in all situations during clinical examination. In the waiting room he investigated every object, from books and papers on the table to odd material stuck off in corners and behind the desk. During intelligence testing his attention was maintained only by a rapid fire of new material. In the physical examination he demanded to know about everything in the room and what was done to him. Cooperation during the mental interview was possible only when he had something to do with his hands and he answered his questions when busily engaged with some puzzle. When questions taxed his thought he would stop playing for a few seconds, wrinkle his forehead and give up impatiently, with, "Oh gee, I don't know." This physical over-activity is a constant determinant of his behavior and accounts for much of his conduct that is objectionable to both the school and the home. It prohibits his conformation into the mold of behavior which parents and teachers construct for children to meet their convenience and to support their own ideals of conduct. Thus John is at the outset a misfit through a physiological inability to meet the requirements of behavior, and it is inevitable that antagonism will develop against him by those in authority.

This constitutional nervousness is aggravated by emotional difficulties. John is an only child. He is the focus of emotional stress in the home. His father who is a calm, quiet, business-like person, cannot understand this nervous, irritable child. John

likes affection, but the discrepancies between the personalities of father and son preclude an affectionate relationship. The child is the father's greatest trial. He irritates him and causes him to lose his patience. A mental state of irritation is a strange experience for this calm, peaceful person, and its constant occurrence with this child has conditioned and established in the father an emotional discomfort in their relationships. Peace of mind is thus obtained away from the son. He often says he will be glad when it is time for John to go to bed.

John's mother is a placid, phlegmatic, unemotional person. She is not irritated with her son's behavior, and she does not recognize that he is a problem. She is apparently not capable of strong feelings or affection. For her John is only an added duty. Though she says she is fond of him, she shows by her indifference that she would have been happier had he never come. Were it not for him she would have nothing to tie her down. When John comes home from school, she is frequently away, and the apartment is locked because she does not wish him to bring the boys in and muss it up. This occurs at least twice a week and sometimes more often. Even when his mother is home, John is not allowed to bring his friends in.

In examination John shows some emotional conflict over this. He evades answering where he goes after school and only on direct questioning does he acknowledge that his mother is frequently out, and he must play in the hall or, if it is not too cold, outdoors with the boys. He tells this with considerable suspiciousness, drops his puzzles for a moment, and watches the examiner carefully to see if he writes this down. After supper his parents frequently go out. They put him to bed and lock the door. He describes himself left alone. "I pull up the covers over my head. I nearly smother. I see them go out and get in the car. They go down town. Then a big car comes and runs into them. Both daddy and mother are killed. They are the only ones killed and then I cry." He hastens to add he has never told this to his mother. When he saw the examiner writing this down he cried apprehensively, "Are you writing that?" He amends all by saying he dreamt it.

On the other evenings there is company. Then John has a good time and can stay up late because he sleeps in the living room. His retaliation is complete and he seizes the opportunity to disturb everything and to annoy his parents when their hands are tied.

In answer to questioning he indicates he likes his father better than his mother because "he won a car for nothing." But when asked to choose between Mr. ———, the principal of the school, and his father, he immediately chooses Mr. ——— as the one he likes better. Apparently there is no affection for his parents. "They never play with me." He doesn't know whom he likes best in the world, though he stops to ponder the question thoughtfully. He concludes it is his grandmother, because "she gives me the most money."

His entire home relationship has no calming influence for this nervous, over-active boy. The absence of affection and the emotional conflict over his disquieting relationships with his parents are an urge to greater activity and to annoying behavior both at home and at school. In such behavior he both compensates and buries his emotional difficulties. There are few adequate interests provided as outlets for his constitutional overactivity and emotional tension. His irregular habits of sleeping and daily routine are antagonistic to an improvement in calm self-control.

The interpretation of John's case may be given as follows: the combination of a nervous physical make-up, aggravated by the emotional tension in his home relationship and school maladjustment have produced in John the type of behavior which is objectionable to the school: doing things he isn't supposed to do, constant talking, playing for attention, fighting, and teasing. It is partly due to physical urge, partly to satisfy his emotional urges. That he should refuse to take the blame for his misdoings is psychologically adequate behavior for this type of child who has no insight into the reasons for his extravagances and who feels that the entire situation is set up in opposition to himself. Much of his unacceptable behavior is an expression of self-defense against these antagonistic conditions. Since we are here

interested only in understanding the meaning of this behavior we shall forego any discussion of indicated treatment except to say that in the opinion of the diagnosticians it is possible to save this boy to a life of social efficiency and happiness.

In concluding this discussion we may point to the possible significance of a study such as this. In the first place, the behavior of all the children of a school—using the term behavior in its mental hygiene sense—is here singled out for a definite experimental attack. We have been concerned not merely with this or that boy or girl whose failures at social adaptation have been sufficiently gross to enlist the correctional and hygienic agencies of society such as the court and the health department. Rather we have been concerned with social adaptation recognized as a problem for all the children of a community and not a contingency for a few extreme variants. The problem of adjustment is a problem for all. The shifting environmental pressures may alter the fruition of any child's efforts from success to failure, and the socially successful child today may face disaster tomorrow. On the other hand, wise guidance of the child and successful modification of an environment may possibly turn defeat into triumph. The degree to which the educational machine may be modified in behalf of childhood no one yet knows. It is worth something to challenge attention to the possibilities that lie in the direction of such studies as this.

In the second place, our study involves an attempt at a technique for identifying and giving objective and even mathematical description to the socially undesirable behavior of children. The admitted crudity of the methods used is sufficient cause for humility, but they are much better than the nothing with which we started. It is a step in advance when instead of saying that a boy is a "bad boy" or is guilty of anti-social conduct, we try to say in just what particular ways his conduct is undesirable. It is more definitive when we try to say how frequently this conduct appears, and still more definitive when we try to relate the commission of certain undesirable acts to other undesirable acts, to analyze and group all such behavior together, and to express

it in a mathematical term. All this we have tried to do by way of striving toward an adequate technique.

Finally, we venture to hope that the relations glimpsed here between behavior problems and the factors of intelligence, age, grade, and sex may not be without their significance for the everlasting problem of adjusting the processes of education to the needs of the child. If the identification and analysis of childhood behavior do nothing more than serve to exhibit the symptoms of maladjustment, they will serve a useful purpose. If we could perchance devise a technique for understanding such symptoms and for ferreting out their causes, and if we could learn how to alter education so as to allay the symptoms by removing the causes, we should have made a distinct advance in a program of social control.

THE EXPERIMENTAL STUDY OF EDUCATION WITH SPECIAL REFERENCE TO THE ELEMENTARY SCHOOL[1]

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A million children have just been assigned to new grades. Millions of books have changed hands. About 1,500 supervisors are making adjustments in schedules and daily programs. Twenty-five thousand teachers are preparing new lesson plans. Every type of cultural and vocational subject is being cast into suitable pedagogic mould. Measures are planned to insure regularity of attendance and socially approved conduct. A seething sea of activity. What is it all for? Simply to insure to our future citizens ready adjustment to their environment. However we may differ in our conception of the educational process, we come to substantial agreement that the ultimate purpose of education is to prepare each individual to make the most effective adjustment to his whole environment.

This conception of education—a process that seeks to achieve harmonious adjustment between individual and environment—has two inescapable implications: first, that a primary duty of educators is to study the environment. Unless we know the physical, social, economic, mental, and spiritual life that our pupils will probably live, we are not preparing them for any kind of life. Second, that education will be made a changing practice to keep abreast of the changing character of the environment. The processes of living and the ideals of life are constantly changing in the search for fuller realization. Unless education changes as frequently as life, it prepares the youth not for the life he must live but rather for the life that has passed. Educational aims and practices must, therefore, keep pace with the recognized and commonly accepted forward movements of life.

[1] Address delivered at the New York Society for the Experimental Study of Education, February 13, 1925.

Although we have just posited an ideal that seems universally accepted, education is, nevertheless, last on the stage of civilization. Education has always been last to recognize the new controlling factors of life. Science had made colossal strides and had revolutionized the processes of manufacture, transportation, and communication before education recognized this new aspect of life and gave it a dignified place in the curriculum. For generations education clung tenaciously to language study. The history of education is the story of educational isolation, of the divorce between educational practice and daily living.

Education has been last on the stage of progress for two important reasons. In the first place, it was the commonly recognized function of education to preserve the existing conception of life by explaining it, teaching it, preaching it, and justifying it. Education was never regarded as a product of an experimental process. Not until recently did we begin to overthrow the rule-of-thumb practices that were handed down from one generation to another.

We have only the vaguest ideas of the meaning of mental activities, of intelligence, of emotions, of heredity, and of the learning process. One teacher tells his pupils—all prospective teachers—that thought as a mental process is the opposite of habit. His colleague teaches the same group that thought is merely a fusion of mental habits of reaction. Yet one has as much to justify his doctrine as the other.

What are typical questions that must be evolved experimentally? We may mention first the question of drill. We have all been brought up in the belief that formal drill in spelling, in number combination, in factual history, and in locational geography is inevitable. Tomes have been written on drills in arithmetic. Yet, there are those who believe that by creating situations that necessitate the use of certain forms, drill will be obviated. "Banish the spelling grind," they tell us. "Let children write many dictation exercises and letters; need will soon impress the correct spelling of a suitable vocabulary. Do not teach the items of the multiplication tables. Teach rather how to multiply. Let

each child have a conveniently arranged table of all the products in the twelve tables and use these as occasion arises." We are told that teachers will be surprised at the mastery of the tables that will be developed. "Let children follow the flight of aviators around the world and dozens of places are learned without formal drill." This genial assurance is refuted vehemently by those who hold the brief for formal drills. Will debate settle the question? Has debate ever settled any question?

What shall constitute a curriculum? At once we reply, a number of suitable subjects. But will a curriculum, that teaches subjects, teach life? Our curriculum presents a number of isolated subjects—arithmetic, geography, history, civics, reading, spelling, music. Few school people will maintain seriously that there is any relation among these subjects as presented to immature pupils. Each subject is an independent body of facts and necessitates its own set of skills, but the arithmetic we really use is always wrapped up in a question of geography or of manual training or of industry. The geography we use is always part of a question in history or in politics or in economics. Who uses the highly segregated facts of geography as taught in the class? So, too, the spelling we use is inextricably bound up with written expression. The history that we need in everyday life answers a question of politics or of tariff or of race or of immigration. The history that plays a part in our lives is incidental and is a phase of a social or economic problem. Life is a series of imperative situations which are in part arithmetical, in part geographical, in part historical, in part scientific, in part linguistic. Will the teaching of arithmetic, of geography, of history, of civics or of spelling, really prepare an immature pupil to make an intelligent attack on the urgent problems in his path? What reason have we to assume that it will? In order to learn to live, we must live. To live is to learn, but to learn is not necessarily to live. Have not teachers recently been surprised to find how clear in the minds of children is the cause of the eclipse of the sun? Is it not discouraging to note how vague are the ideas which children have at the end of a lesson on causes of seasonal

changes? The reason is clear; our children have lived the first experience but only learned the second. But to develop a course of study that presents a round of actual problems of life requires extensive experimentation.

Then there are other problems that need experimental treatment: how shall we train teachers? By teaching theory and then sending them to classrooms where, in the nervousness attending their first teaching, they forget to apply their psychologically approved methods? Or shall the teacher-in-training begin rather with actual classroom experience?

How shall we determine the educative capacity of children? How shall we measure educative capacity? How shall we give individualized instruction that does not reduce the socializing influences of group teaching? Is kindergarten training a valuable experience? Would the child not gain in the early classes what the kindergarten gives? What answer have we aside from personal opinion? What program of activities will give the best physical development? Will the present system of morning inspection by an untrained eye, together with athletics for the physically skilful, and the dispirited calesthenics of the classroom produce healthy and vigorous youth? How shall we salvage the mental weaklings? What evidence have we that our present system is doing more than would be achieved by merely keeping these children out of mischief? What evidence have we that there is any return to the community for the tremendous cost of the small classes, specially trained teachers, and special equipment provided for the mentally subnormal?

What shall we do with the homogeneously grouped children? The order has gone forth in many school systems that children shall be grouped according to intelligence. What shall we teach the superior child? The same course of study is taught to all three groups. The outstanding difference is one of speed. Is it our purpose to rush the gifted children through the school course by the end of the eleventh year and graduate them from high school at the age of fourteen? The junior high-school graduate of eleven is a maladjusted child. Child life is more than mere

school study. The eleven-year-old graduates cannot play with children eleven years old, nor can they play safely with those fourteen-year-old children who are their mental equals. The high-school Senior of fourteen finds few friends among his classmates of seventeen. He is decidedly a maladjusted adolescent and the school has unwittingly become a party to producing his problem. Is education a fixed quantity of subject-matter to be forcibly fed to youth? Is education a treatment to be done with? Is it not rather a process of living? Would it not be wiser to keep the superior child in school longer and to enrich its education by the addition of a variety of manual and trade experiences, by music, by physical activities, by club life, by visits to museums, and by extensive reading of fiction, of current events, and of biography? Where is the enriched curriculum that is so frequently promised?

What is the modified curriculum of the slow group but the shell of the present curriculum? In order to escape from the indictment of a lock-step system, we are developing a double-step system.

These are only a few of the host of problems of modern class teaching that must be solved by a system of educational experimentation. No conclusion reached by means other than experimental technique can command our attention, nor can such conclusions give an enduring solution.

Two outstanding conditions retard the development of experimental education. The first is the traditional function of education to which we have previously referred. Education has concerned itself too much with preserving the past and too little with preparing for living and participating in life. If that conception prevails, there is no drive towards experimentation, no motive to evolve new aims or objectives, and no reason to formulate new curricula and new teaching practices.

A second deterring condition is the absence of commonly accepted objective measures in terms of which the products of new educational methods can be measured. Not until recent years has the movement for scientific measurement gained any head-

way. Despite the phenomenal progress which testing has made, we still have few measuring media that are generally accepted. There are still too few supervisors who understand the tests and who are competent to direct their administration and to interpret resulting data. No science can thrive without commonly accepted measuring media. Too long have educational values been determined by debating the merits of personal opinions.

How are most issues settled in education today? The disturbing question before the house of superintendents is whether to subtract by the additive method or by the process of diminution. Shall children think, "8 and what number give 14," or, "14 minus 8 leaves what?" For every argument advanced for the one method, an equally telling answer is proposed for the second. The debate continues, each school man drawing on his own limited experience for illustration, until fatigue accelerates developing impatience and the vote is taken. If a majority can outtalk a minority, the debate ends and an order is promulgated which sets hundreds of thousands of children to "subtracting by adding." Do the members of the board confess that personal opinion is an inadequate basis on which to proceed? Do they admit that each of us is too habituated in his process of subtracting to see the other method without prejudice? Do these men and women decide to teach both of these methods to many classes and then administer a test under scientific conditions to determine which method produces a higher rate of accuracy and readier habituation?

What if this method of debate were used in medicine? Let us assume that a pediatrist evolves a dietary for infants between six and nine months that calls for the use of a liberal amount of tomato juice. Does this physician start a debating society to see whether he can talk any other doctor into an ignominous defeat on the conjectured advantages of his dietary? Does he not rather decide on an objective test to determine the value of his infant dietary—increase in weight, in length or height, progress in ossification, length and quality of sleep, increase or decrease in irritability, and improvement in excretory function? What a

physician thinks of the proposed diet must give way to results obtained by objective, impersonal tests.

As long as educational issues are settled by personal opinion so long will experimental methods be retarded. Without commonly accepted objective standards there seems no real reason for extensive experimentation for there is no way of arriving at an impersonal evaluation of the procedure under investigation.

Our discussion must, therefore, turn to a vital question concerning the development of objective tests. If standardized tests are an absolute essential to the development of experimental education, why have we not yet devised a set of commonly accepted measuring scales? Why is it that with all this feverish work on tests we have not yet evolved a few intelligence tests and a standardized test in each subject that we are as ready to accept as the yard or the pound. The reasons are many. We must stop for a few of the most vital ones.

1. To begin with, standardized tests are suffering from overpopularity. Their popularity is almost an affliction. Everybody has an opinion about their validity. The comparatively simple technique in devising a test has been mastered by many. The result is a deluge of tests in every subject. Test follows test until no one in America knows all the tests or is prepared to present conclusive data on the relative merits of any one of them.

In the introductory period of testing it was commonly asserted that the mind is too elusive, that mental states are too indefinite, and mental reactions too uncertain to permit of quantitative measurement. The fear was expressed that if exact statistical measurement were possible, teachers would develop an impersonal attitude towards the child. Sympathy would be supplanted by a cold, critical, analytic approach to all classroom situations. Each child would be regarded as a case.

The fears that caused such misgivings are completely forgotten. The country is almost test crazy. Once more we find an illustration of the unreliability of personal opinion as a measure of worth. Today, we are too ready to accept the tests and all that an enthusiastic author says for his scale.

Some school systems have recently announced a list of "approved" tests. On what basis were these tests admitted to the select circle? What tests were made of the tests? How does one intelligence test compare with another in regard to predictive value? These approved lists do not answer these questions because the literature on evaluation of tests is singularly meager. It is almost silent on these vital questions.

We need not more tests, not further unquestioning acceptance of them but rather a more scientific technique of developing and evaluating tests and a more critical attitude towards them. Nothing more desirable could happen to further the cause of scientific testing than to prohibit for five years the addition of a single new test to the surfeited market of test material.

2. Tests are suffering from our inability to formulate, clearly and concisely, the definitions of basic terms and ideas. We are measuring intelligence, but what is intelligence? What are the answers?

Terman insists that it is unreasonable to insist on a definition of intelligence before measuring intelligence. Measure something that is highly complex and you will understand its nature. Measure something that you do not know and you will discover what it is. This position, surely, is not without defense.

Witmer tells us that "intelligence is ability to solve new problems." Intelligence is, therefore, congenital and cannot be increased by training.

To Woodworth, however, "the intelligence of an individual at any age depends on what he has learned previously. But the factors in intelligent behavior—retentiveness, responsiveness to relationships, persistence—may very well be native traits."

Others tell us, Intelligence is "educable capacity," . . . . "capacity to learn from experience," . . . . "ability to act effectively under given conditions," . . . . "power of abstract thinking," . . . . and "power of good responses from the point of view of truth." This is capped by Ruml who complacently suggests that the "vagueness of the term and paucity of information about the facts" make it impossible to discuss intelligence.

We have then three theories of intelligence:

1. The first is the faculty theory of Binet. Intelligence is made up of perceptual power, memory power, reasoning power, imaginative power, and the like. Intelligence tests that measure distinct faculties or powers, are of course, not unknown.

2. Thorndike expresses belief in multiplicity of abilities. To him, "intelligence is a multiplicity of abilities that are related in varying degrees . . . . Having a large measure of one of these abilities increases the probability that one will have more than the average of other good qualities." Thorndike believes there are three types of intelligence or innate abilities: (a) intelligence for words and abstract ideas, (b) intelligence for motor expression and manual power, and (c) intelligence for social adjustments, ability to get on with one's fellows. These three forms of intelligence are usually in positive correlation, namely, the possession of one tends to insure the possession of the other but not always to the same high degree.

3. The Unitary Theory maintains that intelligence is a central factor. Stern believes, "It is a general adaptability to new problems and new factors of life." Cyril Burt holds a belief not unlike this one for he tells us, "It (intelligence) is a single complex quality rather than a group of independent elements."

In this conflict of opinion, who is right? It seems reasonable to assert that most recognized psychologists believe that intelligence is general mental ability; manifests itself in different forms; is a native endowment; concerns itself with perceiving relationships rather than with merely perceiving experiences; maintains a fairly uniform level through the age of an individual; and distinguishes native power from the skills we acquire through learning. There are certain traps that catch this power. So far, experimentation has shown that a test to complete sentences, to evolve solutions to arithmetical problems and to give words of opposite meaning are among the best of these devices that catch intelligence long enough for us to measure it. But, there must be greater uniformity in our conceptions of intelligence before we can hope to evolve a test of absolute reliability and therefore of general acceptance.

3. A third retarding factor in the development of standardized tests is the arbitrary character of the measuring unit.

Suppose a person achieves a raw score of 40 in a given test. Are we not justified in asking 40 what? Suppose three scores

obtained by using an intelligence test are 40, 60, and 80 respectively. We are not justified in regarding 80 as twice 40 nor in asserting that 40 is as much below 60 as 60 is below 80. The scores found by using even our best scales, Thorndike assures us, are arbitrary totals of units of unknown values.

It is for this reason that we have evolved age norms. We speak of a reading age of fourteen years six months. This covers our ignorance and presents a more vivid, more helpful, and more comforting picture. But surely the basic unit on which the calculation is made is unknown. Would we be satisfied with a height age of thirteen years or a weight age of twelve years? Height and weight can be reduced to inches and pounds respectively. But a reading score of fourteen years six months can be reduced to no known fundamental unit.

4. A fourth retarding factor in the development of scales is their frequent lack of relation to classroom practice. Gray's Oral Reading Test is a case in question. Here we find a scientific analysis of all the qualities that make up effective oral reading; some very vital, others of little significance. What teacher can rate oral reading in all these aspects? Oral reading that conveys the ideas and emotions of the author without doing violence to the phonetic qualities of English must be regarded as satisfactory. The chief concern of the teacher is to develop in pupils the power to extract the thought from the page. Proper oral reading is a secondary accomplishment.

What if a teacher had children write on some of the composition subjects used in certain composition scales! What supervisor would tolerate such work! Our whole emphasis today is on oral composition and on the correspondence of life. Of all the composition scales, only one measures letter-writing ability and none measures ability in oral composition.

5. A fifth retarding factor in the progress of measuring scales is crudeness of technique. How is reading measured? By ability to speak or write or draw? How is intelligence measured? Usually by the mastery of language. Perhaps this explains the high correlation between language and intelligence tests. How

much reading power or how much intelligence is hidden by inabilities that are purely linguistic or manual? Who knows? We hope only little. In measuring composition ability, many factors which are not composition enter. Once more, we must quote Thorndike who says, quite emphatically, "We do not know how much of intellect army alpha measures and how much it fails to measure."

6. A final retarding factor that we must mention are the apparently extravagant claims made for certain tests. Thus, by using the Thorndike-McCall Reading Scale we find a pupil answers eighteen questions correctly. A table of equivalents tells us that the T-score of this pupil is 43. Another table informs us that any one with a T-score of 43 has a reading age of 130 months or ten years ten months. What if the pupil answered 20 questions? Then his reading age would be eleven years nine months. Such procedure may make us believe that we have here an exact measure and tend to make us forget that the whole score is a crude approximation, for psychologists have not yet agreed on even the unit of measure in reading.

So, too, Hudelson is not content with evolving a scale for measuring how well children do write on a given topic. He evolves a scale designed to measure how well children *can* write, namely, their maximum expressional power. We are naturally surprised to learn that when the child writes on "A snowball fight on Slatter's Hill," we can determine how well he *does* write; but that when the subject is, "How I learned a lesson," we *can* ascertain how well he can write.[2] We must be ever mindful of the fact that experimentalists in education are dealing with a complex of human abilities not yet wholly understood; that their methods are still crude; and that their procedure is shot through with assumptions and personal opinions absent in experimental procedure followed in the physical sciences.

Despite these limitations, the tests have weathered the period of introduction. They are decidedly superior to the capricious

[2] Hudelson, Earl. "English Composition, Its Aims, Methods, and Measurement." *Twenty-second Yearbook of the Society for the Study of Education.* Bloomington, Illinois, Public School Publishing Co., 1923. Part I, chap. VI.

tests made by teachers or supervisors. Through these tests we can today achieve more accurate grading of children; we can determine more reliably the permanent effects of our teaching; we can evaluate less capriciously the comparative teaching ability of different teachers; we can gauge, impersonally, the pedagogic worth of special teaching devices and courses of study. The more accurate our knowledge of teaching, of teacher, and of pupil the more effectively can we plan for the development of the child.

Every large educational system needs a central agency charged with the task of planning, directing, and coordinating the experimental activities now in progress in many of its schools. Only a few of our principals are familiar with the technique of experimental procedure. Certainly very few are conducting their experimental work with adequate controls and checks and with that scientific precision which leads to the formulation of the most useful and respected results. To turn to a single illustration, the Dalton Plan is now preached from the housetops. It makes certain promises that ring true. It seems to offer a practical solution of some acute school problems. At least a dozen and perhaps two dozen schools in one city school system are playing with job cards and lesson units as suggested by the Dalton Plan. But what is happening? The plan as applied in one school differs in vital respects from that instituted in another. One principal adapts the plan only to some subjects; another, to all subjects. In one institution, the plan is used in the upper grades, in another, in the intermediate grades. Some believe the plan should be reserved for the superior children, others use it for all children. Let us assume that at the end of the two years of painstaking trial, ten principals report favorably on the Dalton Plan. Notice that no two principals are referring to precisely the same thing. What if the plan proved effective in School X under the guidance of principal A? Can it be used in School Y under principal B?

Suppose we asked each principal, "What control groups did you use? By what objective tests did you measure the worth

of the system? How does the plan work with teachers long experienced in traditional instruction of a whole class at a time? What system of training did you give your teaching staff? What evidence have you that the plan works with children of all satisfactory levels of intelligence? Who did the testing? What experience did these teachers have in the administration and interpreting of results obtained through such testing media?" Clearly, an experienced and authoritative agent must coordinate the experiment and so direct the plan in the process of trial in different schools under different conditions that the most revealing light will be shed upon the question, "Can this city school system hope to achieve genuine individualization of its instruction through the Dalton Plan?"

Are we meeting our full obligation by treading the mill and continuing our task by rule of thumb? And yet we are asking nothing new for education. We are making but a humble plea for introducing into our work the method of experimentation which has been the virtual rebirth of medicine, dentistry, bacteriology, and engineering. Unless we willingly submit our practices to the test of scientific experimentation, we teachers still have a long and discouraging task in lifting our calling to the dignity of a true profession.

INSIGHT AND SKILL IN ARITHMETIC

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Teachers, concentrating upon the details of school practice, and investigators, preoccupied with the technique of research, are apt to lose sight of the broader aims of their crafts. A still more serious myopia commonly afflicts the investigator who only goes into the schools—if he does even that—to collect statistics, and we find in consequence that comparatively unimportant topics are being subjected to an elaborate inquiry of which they are unworthy. Reference need be made to only one of the subjects that have been overemphasized—the psychology of skill. I here intend the term "skill" to have a very wide meaning, and I suggest that the overstudy of skill, in modern educational psychology, is highly significant.

With all the activities of the child in and out of school, and with every subject of the curriculum, are associated certain skills. These skills may be specifically tied to a subject, as calculation is tied to mathematics. Or they may enter into several subjects of related content, as some of the skills underlying grammar enter into all linguistic study. Or they may operate in all study. The mode of procedure in the attack upon mathematical problems, for example, involves skills that, under certain conditions, may operate in fields far removed from mathematics.

This universality of the operation of skill renders plausible a line of thinking often followed by educationalists when they are considering the mode of teaching a school subject. They first try to find out, by analysis and experiment, what skills are involved in studying the subject; and then, putting aside further consideration of the *raison d'être* of the subject as part of the general curriculum, they take up the secondary question of how those skills can be developed. They are then very soon engrossed in the investigation, frequently statistical, of some branch of pedagogical mechanics, and they virtually cease to think about educa-

tion. In so doing they take the line of least resistance, for the psychology of skill, complex as it is, is certainly easier than such problems as the nature of reasoning, the establishment of conviction in the minds of pupils or the rôle of insight in learning. Where the basic skills of a subject have obvious practical value, as is the case with arithmetic, the temptation for the investigator to stress the study of the skills is great, and a very large number of papers dealing with the fundamental arithmetical skills has been published, most of them in America. It is easy for a teacher to become too much interested in the task of making his pupils good calculators, especially if the out-of-school world puts too high a premium upon the power to compute. As will be pointed out later, however, overstress of what we will call the "skill-aspect" of arithmetic—the meaning of this should be made clearer by what follows in this paper—may mean something far more serious, something much more likely to happen in schools, than the devotion of too much attention to pure calculation. It may mean a tendency for the teacher to present all, or almost all, arithmetic as a series of routine procedures, each associated with some general type of problem; and this is a practice more common in both English and American schools than perhaps many teachers would feel disposed to admit.

In the testing of arithmetical abilities it is usual to discriminate between "mechanical arithmetic" and "arithmetical reasoning." The practical advantages of such a procedure are evident. The distinction is clear in the case of a proficient calculator who is also an intelligent arithmetician. In his pure calculations he is dependent much more upon habit than upon insight, and for him this is a valuable economy of thinking. But in the mind of the young school pupil the relations between habit and insight are less definite. It may be desirable that he should employ intelligence to a considerable extent in calculation; and it is always possible, if his teacher is not careful, that the pupil will depend too much upon habit in solving problems. That is to say, many so-called "mechanical" calculations may be really problems for the pupil, and many of his so-called "problems" may be really mechanical calculations.

What is a "problem"? A problem is a situation that can only be reacted to intelligently and with the employment of insight. If the pupil does not react intelligently, even though he gets the "right answer," he has not solved a problem. The problematic character of the situation is a character of the situation *as experienced by somebody*. A situation is not problematic because, in reacting to it, the pupil displays overt behavior of a certain form; we cannot say that this or that type of overt behavior necessarily implies intelligence. What is a problem for one individual may be a routine situation for another. The truth of these statements is well illustrated by the arithmetical performances of school pupils. Many a pupil will be able to solve quite mechanically, without insight, such an exercise as:

If the wages of 25 men for 2 weeks are $1,750 what are the wages of 20 men for 3 weeks?

To the pupil who finds the answer to this sum (1) by recognizing that it has the form he associates with the "proportion procedure," and (2) by remembering and applying that procedure, the exercise is scarcely a problem at all. Yet, if such an exercise had to be included in an arithmetical test, it would certainly be placed as a test of "arithmetical reasoning."

On the other hand, if a pupil *invents*[1] the process:

$$33 - 17 = (33 - 20) + 3,$$
$$\text{or} \quad 33 - 17 = \underline{3 + 10} + 3,$$
$$\text{or} \quad 33 - 17 = \overline{(2 \times 17 - 1)} - 17 = 17 - 1$$

he has solved a problem. A "problem" need not, therefore, have any concrete reference, but may arise out of a "pure number" situation. In a recent publication that contains many good things, Mr. C. B. Upton writes that "a good deal of this problem-solving attitude" can come "from the right method of handling and thinking about the fundamental operations themselves."[2] But there is one sense in which a problem must be *concrete*, in

[1] I might perhaps add "or if he *intelligently uses* the process," but of this I am not sure.

[2] *The Reorganization of Mathematics in Secondary Education.* Mathematical Association of America, 1923. 652 pp. A report of the National Committee on Mathematics Requirements.

order that it may be a problem, for the pupil, at all. It must refer to a situation which is sufficiently familiar to the pupil for him to be able to realize the full significance of the data and to see clearly what it is that he has to find out. The situation is not, as I fancy Dewey has pointed out, problematic until the pupil *feels* that there is a problem. And we ought not, in strictness, to speak of certain exercises being in "problem form," since the problematic nature of an exercise does not depend upon its "form." In fact, many of the "verbal problems" that appear in textbooks of arithmetic are not really problems for many school pupils, for the form of words in which the problem is expressed frequently suggests to the pupil the kind of calculation to be performed, and he can then "solve" the problem without any insight.[3]

Every problem is less of a problem to the extent to which it can be solved by memory of the methods by which similar problems have previously been solved. The expression "drill in problem solving," which some writers have employed, is therefore, a misnomer; for in so far as previous experience—in the form of the "drill" referred to—enables an exercise to be solved, that exercise is not a problem. It is, of course, desirable that pupils should avail themselves of the economy of thinking which becomes possible when they recognize that an exercise is similar to one with which they have previously dealt intelligently, but a danger lurks here to which I think it is worth while to draw attention. We do not want the solution of exercises in "arithmetical reasoning" to consist simply in classifying those exercises into certain types, and then applying a formal process of calculation according to the type to which any particular exercise belongs. Many problems refuse to be classified. Let us take a problem at random from an arithmetical textbook,[4] and see in what the solution of the problem consists.

The composition of air by weight is 77% nitrogen, 23% oxygen. Find the percentage composition of air by volume, given that the specific gravities of nitrogen and oxygen are in the ratio of 14 to 16.

[3] Illustrations of this are given in an article on "Suggestion, Reasoning, and Arithmetic," by E. J. G. Bradford. (*Forum of Education*, 3:3-12, February, 1925.)

[4] An English book: Palmer's *Arithmetic*.

My first step here is not to ask myself to what class of problems this belongs. It is rather to picture the situation somewhat as follows: If in 100 units of volume of air there were V units of nitrogen, and v of oxygen, the ratio of the weights of these would be V/v, if the gases were equally heavy, and $14V/16v$ if their densities are in the ratio 14:16. (Here I am certainly helped by clear understanding of the meaning of specific gravity, and by remembering almost as a mere rule that Weight = Volume × Specific Gravity).

I continue thus:

$$14V/16v = 77/23, \text{ i. e., } V/v = 88/23$$

$$\text{Therefore, } \frac{V+v}{V} = \frac{111}{88}$$

But $V + v = 100$.

Then I solve the simple equation that obviously follows.

(This step is pure memory of a method of dealing with fractions, which here I employ without "insight").

Although it is clear that at various points in this solution I used knowledge acquired in the solution of other problems, yet the reasoning employed as a whole has never been used before. The method is devised *ad hoc* with the conditions of the problem clearly in mind. I suggest that the solution of problems by school pupils should be of this same insightful character. From the same textbook I take at random a simpler example:

The distance round a race course is 345 yards. How far will the winning post be from the starting point in the mile race?

The solution of this depends upon division (345 into 1,760 is 5 and 35 over). But I arrive at that answer, not by recognizing the exercise at once as a "division problem," but by imagining a race to take place around the course. It is then clear that when a runner has gone round 5 times (1,725 yards) he has a further 35 yards to go. I am not aware that I am to any considerable extent helped in the solution of this problem by the fact that I have solved similar problems before. The solution depends simply upon clear insight into the situation.

Dr. Harry A. Greene writes: "Teachers of arithmetic are coming to consider that their two most important teaching tasks are that of increasing the skill with which their pupils use the fundamentals, and that of increasing their knowledge of when

to use them."[3] It is, of course, true that "knowledge of when to use the fundamentals" implies some insight into the problems to which the fundamentals are applied, but it is not the whole truth to say that the process of solving an arithmetical problem consists essentially in searching the mind for a suitable form of calculation. The most important part of the process of solution consists in obtaining a clear "insightful" grasp of the situation, which is perhaps the process to which Mr. Greene refers as the "organization of the problem." I should say that "the two most important tasks of the teacher of arithmetic" are that of developing arithmetical insight, and that of getting their pupils to enjoy and value arithmetical work.

The number of inquiries that have been made into the psychology of drill in arithmetical fundamentals is as astonishing as the number of wrong conclusions that have been reached. I suggest that many investigations that have been carried out in this field have been either irrelevant, or prejudicial, to sound educational practice. Many of these investigations seem to have arisen rather from an interest in pure psychology and in statistical inquiry than from a clear understanding of the rôle of arithmetic in education. If we were primarily concerned with making a proficient computer out of the child, it would be questionable whether drill would be advisable in the teaching of young pupils; and if proficiency in calculation is only one, and probably not the most important, aim in the teaching of elementary mathematics—which should replace pure arithmetic in *all* schools—the overemphasis upon drill in calculation must be regarded as serious.

The value of research connected with arithmetic and with the teaching of mathematics generally would be enhanced if the investigators would give due attention to the following points:

1. The distinction between *psychological* problems of learning, for the solution of which it may be convenient to study the acquirement of skill in computation, and the *educational* problems connected with the teaching of elementary mathematics. Relatively mechanical manipulation of number is a process in

[3] "Directed Drill in the Comprehension of Verbal Problems in Arithmetic," *Journal of Educational Research*, 11:33-40, January, 1925.

the observation of which we may profitably study matters that have a wide significance in psychology, such as the relations between speed and accuracy in operations that depend primarily upon habit, or the general question of the effects of different distributions of practice. Such studies of the psychology of efficiency may be of but secondary importance to school teachers.

One illustration of this must suffice. Let us suppose that it could be shown that, with normal pupils of ten years, we can make most rapid progress towards speed and accuracy in the fundamentals of arithmetic by administering a dose of organized drill every day. By "drill" we here mean exercises in computation in which the pupil is encouraged to proceed according to fixed rules of manipulation, and discouraged from reasoning about the number relations involved in the work. It would, nevertheless, in the opinion of the writer, be educationally unsound to give drill to these ten-year-olds. Our aim in the arithmetic lesson is not to produce as quickly as possible proficient computers, but to give in the most interesting and impressive way insight into number facts and relations.

Thorndike has well written that "the work a pupil does with numbers should be a main means of increasing his understanding of the principles of arithmetic as a science." The point of view opposite to this is perhaps shown by Courtis when he says that where children have difficulty with particular combinations, such as $9 + 4$, we may

> Use one of the roundabout methods, as breaking the 4 into $3 + 1$ . . . . or try to establish some association, as the sum of any number and nine is always one less unit in the next tens, —4, 13. *But such methods should never be used except as a last resort.* . . . Every thought takes time and energy, and it is wrong to make a child think two thoughts to get a given sum when one will do.[1]

If the sole purpose of the exercise is "to get a given sum"—as would be the case when a bank clerk adds up a column of figures—then the less thinking the better. But if we are giving the exercise chiefly in order to give the pupil a chance to think,

[1] In the Introduction to the *Manual* describing his Practice Pads. The italics are also those of Courtis.

it may be better for him to think two or three thoughts where, in fact, "one will do."

2. The distinction between formal and rational calculation is further discussed later.

3. The need for more studies of an introspective character, of which Mr. Greene's paper, already referred to, is one, without which it is impossible to interpret the results obtained by objective methods.

In the conclusion of this paper, which will be regarded by some readers as heretical, by others perhaps as retrograde, let us look more fully into the second distinction already mentioned.

Dr. W. J. Osburn tells us that "If a pupil is to attain mastery of the fundamentals of arithmetic, he must be able to respond correctly to each of 1,470 combinations."[7] What he means is that for calculation to be absolutely automatic we must be able to respond by pure habit to 1,470 combinations; a calculating machine would have to have parts for 1,470 movements. But the calculations of young pupils are not, or should not be, absolutely automatic. I think I could do any kind of arithmetical calculation that I might be asked to do, but I know that I do not know 1,470 number facts in the sense that Dr. Osburn would have me know them. Indeed I doubt whether, in that sense, I "know" that $23 + 8 = 31$; nor, when I perform that calculation do I use a fact that I *do* know in Dr. Osburn's sense, namely that $3 + 8 = 11$. In fact, I quickly add 10 and take 2 away. The *process* $+ 8 = + 10 - 2$ is one of my habits; but it may be applied to an infinite number of calculations. If I am asked to find 2,340 — 1,980, I use, as far as I am aware, two habits in obtaining the answer. The first habit might be expressed as a rule—which I generally, but do not always, apply: "To find the difference between two numbers which are respectively x units above, and y units below a convenient number (in this case 2,000, add x and y;" and I am aware of the truth of this rule every time I apply it. The second habit is just $20 + 340 =$

[7] "A Study of the Validity of the Courtis and Studebaker Practice Tests in the Fundamentals of Arithmetic," *Journal of Educational Research*, 8:93-105, September, 1923.

360. So I get the answer 360 with very little trouble and by the method that the majority of adults would in fact employ. If the formal process of subtraction were applied to this exercise a much greater number of habits would be involved.

In the formal performance of the following addition we proceed thus: "7, 15; Carry 1; 6, 9."

$$\begin{array}{r} 38 \\ \underline{57} \\ 95 \end{array}$$

What we are calling "rational calculation" would proceed:

(1) $57 + 38 = 57 + (40 - 2) = 95$;

or (2) $50 + 30 = 80$; $7 + 8 = 15$; $80 + 15 = 95$

These methods are only rational to the extent to which there is *invention*, or insightful approval, in our use of them. If, for example, I always added 38 to another number by adding $40 - 2$, I should probably do so without insight after the first few occasions of using the rule. The rule would then be as truly a formal rule as those employed in the formal sum in the margin above. I do not say that an adult is any the better for using a rational method to add 38 to 57; but I should say that, as a rule, a school pupil is the better for so doing.

In most of the calculations of most people, formal (habitive) and rational (insightful) methods are almost inextricably mixed up. Insight is continually flashing over their mental processes and then dying down. That form of psychology, so much favored by workers in this field, which describes everything in terms of bonds between stimuli and responses is quite incapable of giving an adequate description of pure calculation, to say nothing of its inability to describe how we solve problems; for in that psychology there is no difference between insightful procedure and purely habitive procedure. Much light might be thrown upon this subject by introspective studies of their own processes of calculation by adult computers trained in the description of what goes on in their minds. They would especially have to pay attention to the rôle of imagery in their calculations, and to determine whether they ever reached conclusions with regard to number relations without the use of any kind of imagery at all.

NEW YORK STATE REGENTS LITERACY TEST

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To apply the technique of standard-test-making to improving the general educational average of the new electorate of a large state was a bold undertaking. To have that application upheld by the Court of Appeals,[1] the highest tribunal of that state, was a goal scarcely to be dreamed of by the most zealous friend of educational measurements ten or even five years ago. Both of these goals have been attained in the brief three-year history of the *New York State Regents Literacy Test for New Voters*.[2]

Literacy tests for new voters are not new in the United States. Massachusetts passed such a law in 1857. Before 1921, nineteen states had adopted constitutional provisions relating to a literacy test as a qualification for voting although three of these states had not enacted statutes to give effect to the constitutional provision; and in one state the law accepted as an alternative to ability to read and write the bona fide ownership of property having an assessed value of not less than $300.[3] The following extract from the Massachusetts statute is typical of the statutory provisions in the fifteen states that had enacted literacy-test requirements for new voters previous to 1921:

> The registrars shall examine on oath an applicant for registration relative to his qualifications as a voter, and shall, unless he is prevented by physical disability, ... require him to write his name in the general register, and to read in such manner as to show that he is neither prompted nor reciting from memory.

The statute further specifies that the reading shall be from slips of cardboard each containing five lines of the state constitution—these slips to be prepared by the State Secretary.[4]

[1]Decision, New York Court of Appeals, Chadbourne vs. Voorhis et al. October 1923.

[2]"New York State Regents Literacy Test," *University of the State of New York Bulletin*. No. 744. October 15, 1921.

[3]Unpublished Report,—"Constitutional Provisions of Certain States Relating to Literacy Test as a Qualification for Voting. Revised to March 1921" by William E. Hannon, legislative reference librarian, New York State Library, Albany.

[4]*Massachusetts General Laws 1920*, Vol. 1, pp. 352, 353, 360.

The influence of the Massachusetts law and its eighteen successors was evident in the first paragraph of Section 166 of the revised election law of 1922, as quoted below:

Section 166. Test or proof of literacy. 1. There shall be in the place of registration, where registration is required to be personal, one hundred extracts from the constitution of this state, of approximately fifty words each, which extracts shall be selected by the Secretary of State. Such extracts shall be printed in English on uniform pasteboard slips in double small pica type, and the slips shall be kept by the inspectors in a box so constructed as to conceal the slips from view. The new voter, if required to prove his ability to read and write English, shall draw out at random one of such slips and read aloud intelligibly all of the matter printed thereon and shall then write legibly in English ten words of the matter on such slip, to be selected by an inspector. Each slip shall be returned to the box immediately after each test and the contents of the box shall be shaken up by an inspector before another drawing.

2. A new voter may present to the board of inspectors a certificate of literacy signed by the principal or other head of a public school in the city or town in which the voter applies to be registered, or of any school in such city or town whose course of instruction has been or shall be recognized by the state department of education as being of required standard, to the effect that such principal or head has examined the voter, or his educational credentials, and certifies that the voter is able to read and write English, and that the signature of the voter appended to such certificate was made in the presence of such principal or other head, to which certificate of literacy shall be appended the affidavit of the person signing such certificate that at the time of such examination and the signing of such certificate he was the principal or head, as the case may be, of such school. Thereupon, if the board finds that the voter's signature appended to such certificate of literacy corresponds with his signature, which shall be made by him in the presence of the board, that such voter is the person named in the certificate and that the certificate is genuine, the voter shall not, unless an inspector shall so demand, be required to take the test specified in the foregoing subdivision. The board of regents of the University of the State of New York may adopt and enforce rules governing the issuance, and further authentification, of such certificates of literacy and the preparation or examination of applicants therefor.

The second paragraph of the foregoing section was an amendment to the original bill. It was promoted by a literacy-test conference held in New York City during the time the bill was in process. This conference consisted of representatives from the following organizations: Honest Ballot Association,

City Club, Citizens Union, Council on Immigrant Education, Women's City Club, Henry Street Settlement, New York State Association, Federation of Churches, International Institute for Young Women, West Side Y. M. C. A., Catholic Charities, New York State League of Women Voters, and Columbia University Bill Drafting Bureau. In addition, the chief counsel for the committee which drafted the election-law revision, and members of the State Department of Education were present.[5] It was the interest and active support of these organizations which added the second paragraph and so led directly to the sweeping reform in literacy-test legislation enacted two years later by the New York State Legislature.[6]

Following the enactment of the foregoing statute, the Commissioner of Education, Dr. Frank P. Graves, appointed two committees, one to formulate a test to fulfill the requirements of the second paragraph of the statute and the other to devise a plan for administering the test. To give unity to the work of the two committees, Mr. Alfred E. Rejall, supervisor of Immigrant Education in the State Department of Education, was made chairman of the two committees.

The committee that was to formulate the test, in addition to Mr. Rejall, consisted of the following men: Professor William A. McCall, Teachers College, Columbia University; Professor Paul Kruse, Cornell University; Professor J. Carleton Bell, Maxwell Training School for Teachers, Brooklyn; and the writer who was at that time Specialist in Educational Measurements for the New York State Department of Education.

The first act of the committee was to analyze paragraph one of the new law to determine what the probable success of its administration would be. Obviously the key ideas of the law were: "read aloud intelligibly" and "write legibly." The next step was to study the material that was to be "read aloud intelligibly." A word study was made of the State Constitution:

[5] *Literacy Test Administration. State Bulletin of New York State Association.* Sup. to Vol. II, No. 5, pp. 2-3. March, 1922. Albany, N. Y.

[6] *New York Laws.* 1923. Ch. 809. Sec. 166. Proof of literacy and regulations.

this word list was checked first against the Thorndike 10,000 word list and second against the first 4,000 of the Thorndike list.[7] This analysis netted the following facts: the New York State Constitution contained 20,733 running words, made up of 2,098 different words; 658 of these different words did not appear in the Thorndike list; and only 1,120 were found in Thorndike's first 4,000. This last fact is important; because Dr. Thorndike estimated that these 4,000 words represented the reading vocabulary of an average child at the end of the fourth grade of the American schools. Not only were half the different words of the Constitution above the fourth-grade level, but more than one-fourth were not contained in the most commonly used 10,000 words and of these many were archaic or strictly legal terms almost never used outside of legal writings. Obviously a random selection of extracts of 50 words each would almost surely contain words that the average reader would neither know nor understand. To read such extracts aloud "intelligibly," therefore, would have no meaning; and the test would merely become a dead letter or a tool to permit election officials to control large elements of the new voters.

To "write legibly" such ten words of the extract as might be selected by the inspector admitted at least two uncertain elements into the test. First, all words in any selection were not apt to be of equal difficulty. One inspector might select a part of the extract consisting of ten easy words whereas another might select another part consisting of ten words much more difficult to write. Second, each election inspector would be set up as a judge of "legible" handwriting. Such a test so administered admitted an unlimited subjective element.

The committee's second step was to determine the purpose or intent of the law. It was evident, not only from the law itself, but from the debates and discussion that had preceded its enactment, that the law aimed at two goals: first, to deprive new voters, who had not gained the ability to read and write the English language, of the privilege of the ballot; and, second, to

[7] Thorndike, E. L. *The Teachers' Word Book.* New York, Bureau of Publications, Teachers College, Columbia University, 1921. 134 pp.

raise the general educational average of the new electorate. Requiring the new voter to be able to read implied that he must be able to read current political discussions in order to vote intelligently; and requiring him to be able to write implied requiring him to have the ability to express his thoughts through the medium of written English.

The committee, therefore, laid down two principles for its guidance in preparation of a test to meet the requirements of paragraph two of the statute: (1) the reading test must determine the voter's ability to comprehend or understand the meaning of what he read; and (2) the writing test should determine his ability to make his thoughts in writing understandable to others.

Since the law permitted each local election inspector to determine whether he would accept a certificate of literacy issued by the school principal or require the new voter to take the test prescribed by the Secretary of State, the committee was confronted with two very important problems: (1) to gain the cooperation of the Secretary of State and through him the election officials of the state; and (2) to make a test so superior to the first that public opinion would soon demand that it be made the sole test for determining the qualifications of the new electorate.

To achieve the first end the committee presented through its chairman to the Secretary of State what it believed to be the weakness of the test that he was required to prepare, and what the committee believed a literacy test should be. As the result of a series of conferences, the Secretary of State accepted the suggestions of the committee for the preparation of his own test,[8] and further agreed to send out a letter to election officials urging that they accept all bona fide certificates of literacy secured as a result of the test prepared under the authority of the Regents. No group of professional workers ever received better support from a political organization than was rendered the committee by the Secretary of State and his associates.

[8]The chief of these suggestions was that selections from the Constitution should be so made that no archaic or unusual words would be included.

The next step was to develop a test to be administered through the public-school system. The following fundamental principles were agreed upon:

1. The reading test should be a test of comprehension.
2. That each test should consist of one selection followed by approximately ten questions based on the selection.
3. That the questions should require brief answers preferably of the single-word type; and that reading should include a comprehension of both the selection and the questions.
4. Selections should be approximately one hundred words in length; should deal primarily with civic questions; and should, as far as possible, be made up of a vocabulary confined to the first four thousand words of the Thorndike list.
5. That the several tests should be standardized on the basis of the median achievement of children at the end of the fourth grade in city schools.
6. That ability to write answers well enough to be understood by the examiners and to write one's name should be accepted as proof of the ability to write in English.
7. That the score key should utilize McCall's "key-word" plan for scoring reading tests.
8. That instructions for giving the test should take into consideration the language difficulties of the majority of new voters who would take the test.*

Dr. William A. McCall prepared the instructions for giving the test. Classes in educational measurements and individuals were invited to submit selections; and each member of the committee prepared eight or ten selections. Altogether, 1,326 selections on ninety-three different subjects were prepared. From this list, the committee chose sixty different selections or tests; and utilizing the judgment of other people reduced this number to thirty. These thirty tests were then mimeographed. Examiners were selected who met with the chairman of the committee and the writer for instructions. Following this conference, each of the thirty tests was given to two hundred or more end-of-the-fourth-grade pupils in the public schools of Troy, Albany, Schenectady, and New York City. In selecting schools, effort was made to apply each test in schools ranging from those located in the foreign settlement to those in the wealthier residential

*For detailed statement of criteria *see* Rejall, A. E., "A New Literacy Test for Voters," *School and Society*, 19:233-238, March 1, 1924.

sections thus making certain that each test had been standardized on about the same types and varieties of fourth-grade children. From three to seven tests were given to each class group but the order was varied from class to class so that no one test would serve the effect of being a practice test.

Before the tests were mimeographed an answer sheet or score card had been prepared for each one. A staff of scorers was trained by the writer and his assistant. Record was kept of every answer to each question. Wherever it was found that a question admitted of a number of answers or otherwise seemed ambiguous it was thrown out. After revising the scoring key and rechecking the scoring, diagnostic tables were prepared showing the response of each pupil on each question that was retained, the percent of correct responses on each question, and the median number of questions answered correctly for each test or selection.

From the foregoing, it will be seen that it was possible to take the median obtained for each test as the standard for that particular test without expending the prodigious amount of labor needed for building thirty tests of absolutely equal difficulty in content and with numerically equal standards. At the same time, although the numerical measures of the several tests differed somewhat, the tests were equivalent in difficulty since the standard in each case equalled the median achievement of end-of-the-fourth-grade pupils on that particular test.

Inasmuch as voters in New York may register at different times of the year preceding each election time, it was necessary to have a different test for each registration period. Six tests were printed the first time; the remainder of the thirty acceptable tests first standardized were filed for future printing. It was the judgment of the committee that a test ought not to be used a second time.

The tests were printed on good ink paper approximately eight by ten inches, the instructions and examiner's record on one side; and the test on the opposite side. A copy of Test 2 follows.

NEW YORK STATE REGENTS LITERACY TEST

Test 2

Write your name here.....
First name Middle name Last name

Write your voting address here.....

Write the date here.....
Month Day Year

Instructions for the Test

This is a test to see whether you can read and write English. On the other side of this sheet there is a selection for you to read. First, read the selection. Next, read the first question. Then, go back and read the selection until you find the answer to this first question. Usually, the answer will be only one or two words. When you have found the correct answer, write it on the dotted line after the first question. You need not answer in a complete sentence. Write the answer as plainly as you can, for this is a test of both reading and writing. Answer all the other questions in the same way. When you have answered every question, read the selection and answers to your questions over again, and make sure you have made no mistakes.

1 Is there anybody who does not know what we are to do?
2 When you turn the sheet, what are you to do first?
3 Where will you find the answers to the questions?
4 Where are you to write the answer to each question?
5 Do you need to answer in a complete sentence?
6 How many words will there usually be in the answer?

If you have any other questions, ask them now.

Do not write in the space below.

Turn your paper over—begin reading.

(To Be Filled in by the Examiner)

Number of answers correct.....

Candidate's rating .....
P (passed) F (failed)

Place where examination was held.....
County (City, village, town)

Certificate of literacy was.....to successful candidate.
(mailed or delivered in person)

Signature of examiner.....

Title of examiner.....

Notify unsuccessful candidates that they may take examination given by local election officials.[18]

Examiner will preserve both successful and unsuccessful papers for at least three months after election day—they should then be destroyed.

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[18]This sentence is omitted from editions published since the revision of the law in 1923.

NEW YORK STATE REGENTS LITERACY TEST

Test 2

Read this and then write the answers. Read it as many times as you need to.

A milk wagon was passing along a street, loaded with boxes of empty milk bottles. One box fell off and the bottles were smashed all over the street. The angry driver stopped, picked up the box, and drove off. But two boy scouts who were passing stopped. They patiently picked up the broken glass. They wrapped it in a newspaper, and carried it to an ash can not far off. Why did they take so much trouble? Because they realized that the street was a place that belonged to them. They knew that, if the glass stayed there, somebody's automobile tires would suffer.

1 What sort of wagon was passing along the street?.....

.....

2 With what was the wagon loaded?.....

.....

3 How many boxes fell off the wagon?.....

.....

4 Who was angry? .....

.....

5 Who were passing when the accident occurred?.....

.....

6 What was wrapped in a newspaper?.....

.....

7 What part of the automobile would be damaged?.....

.....

The scoring key for the six tests was printed on the two sides of a sheet 5⅞ × 9 inches. The heading and key for Test 2 follow.

THE UNIVERSITY OF THE STATE OF NEW YORK
THE STATE DEPARTMENT OF EDUCATION
NEW YORK STATE REGENTS LITERACY TEST
KEY FOR SCORING PAPERS

Test 2

Incorrect

1. *Milk* wagon.
2. Boxes of *empty* milk *bottles, empty* milk *bottles*—milk bottles
3. *One* box.
4. Driver . .....man
5. Two Boy Scouts, Some Boy Scouts.....two boys
6. Broken glass, broken bottles.....bottles
7. Tires.

Required number of correct answers for passing credit—6.

The committee on administration of the test recommended that the city and district superintendents of schools be responsible for administering the tests. The superintendent should select his assistants and determine the centers where the test would be given. Within certain limitations he should also decide the days and hours for administration of the test.

The reports of the two committees were approved by the Commissioner of Education and the Board of Regents. The latter adopted such regulations as were needed for putting the test into operation. Under the direction of the Commissioner, Mr. Rejall prepared a bulletin[11] of "regulations and directions" and the test was ready for the October, 1922, registration.

When the legislature convened January, 1923, the usability of both tests was a matter of record. Responding to the persuasion of school people and citizens interested in civic improvement, the legislature abolished the test requiring the reading of an extract from the State Constitution and made the New York State Regents Literacy Test the only test for new voters. The conflict between the old and new types of literacy tests, however, did not end here. "The State Attorney-General ruled that the election law had not been properly amended and held that the alternate test still stood. But in a test case before the Appellate Division of the Supreme Court in New York City, this opinion was promptly rejected. It was decided that the literacy test as devised by the Board of Regents is the only legal one and that the schools had full and sole power to administer the test. This decision was affirmed shortly afterward by the Court of Appeals, the highest tribunal in the state."[12] Thus the highest courts of the Empire State upheld the fundamental principle laid down by the committee, namely, that a test of reading ability should measure the candidate's ability to read with comprehension of the meaning of what he read. Thus the work of the

[11] "Regulations and Directions Governing the Issuance of Certificates of Literacy and Conduct of New York State Regents Literacy Test." *University of the State of New York Bulletin* No. 774, October 15, 1921, (Revised each year).

[12] "Triumph of the Literacy Law in New York," *Educational Review*, 31:40, January, 1924.

makers of standard silent-reading tests has reached over into the field of civic life far enough to induce a leading state to change its literacy requirement from ability to "read intelligibly" to ability to "read intelligently."[13] Since our states presume to require educational qualifications for new voters, New York has demonstrated how such a test may be scientifically constructed and intelligently administered.[14]

[13] Voorhis, John R. "An Educational Test for the Ballot," *Educational Review*, 31:1-4, January, 1924.

[14] The following data show the use of the Regents Literacy Test for 1923:

Number of literacy certificates issued on the basis of day school educational credentials	7,829	
Number of literacy certificates issued on the basis of evening school educational credentials	767	
Number that passed New York State Regents Literacy Test	19,806	
Number that failed New York State Regents Literacy Test		5,392
Total number of certificates of literacy issued in 1923	28,402	

Editorials

THE SCHOOL CLERK

There are possibilities in clerical service which the schools have never realized. Most schools have no clerk, and we have positive evidence that the principals of many of these schools have little notion what they would do with a clerk if they had one. Large schools in populous centers sometimes have a person who is called a clerk; but this person is much more likely to be a would-be or has-been teacher, who is, at least temporarily, unable to secure a permanent classroom position. There is a mistaken notion that anyone can do clerical work. What the modern school needs is a modern point of view in this as in other matters. We undoubtedly have use in our schools for better clerks and more of them.

Consider the principal's office. It is surprising how many records each principal and his teachers are supposed to keep. Most of these records have come upon the scene—all except the ancient register—within fairly recent years. Neither teachers nor principals have been particularly trained to keep records, nor have the exactions of their supervisory and teaching services been diminished in order that they may do so. It is true that much of the making of *original* records, especially of the pupil-accountancy type, cannot be done by clerks. Attendance, for example, can be taken only by the teacher. But the making of *derived* or secondary records is essentially clerical work, and the modern school requires many such records.

Most schools, for example, keep a pupil's record card. Such records have been in existence in some school systems for fifteen or eighteen years, but they have never been very satisfactory. The most glaring inaccuracies appear upon them—perfectly im-

possible entries; and the omissions are numerous. Thorndike in 1907 pointed out that the only satisfactory way to study the question of elimination was from the individual histories of children, such as the pupils' record cards are supposed to afford. Other investigators have said the same thing; yet no one has ever been able to use these records satisfactorily for such a purpose. The chief reason is that they are insufficiently and inaccurately made and that they are defectively routed and filed. If it is decided that records of this sort should be kept—and they certainly should be—then the cost necessary for keeping them properly should be met. Clerical service—service trained and devoted to this type of work and to this primarily—is the only reliable type of service.

Then there are other uses for clerks in the schools. Have you ever thought what a remarkable opportunity for such service is made possible by the lately devised techniques of objective testing? Consider, for example, a clerk serving the history department of a large high school, or of a college. Very likely a departmental clerk could not make up these examinations, although even this would not be impossible with training and experience. But it is certain that a clerk could rate the papers. That is what the objective technique means. It means that a given set of true-false, multiple-choice, or completion items would be rated the same by anybody who can use a set of answers. Moreover, with a clerk to type and mimeograph the papers, to rate them, and to render a tabulated report on them, the history department, about which we are speaking, could give a short quiz every day. We all realize how much our classes would be benefited by a five- or ten-minute daily quiz. We don't give such tests frequently because of the labor involved in rating the papers.

Clerical service would change all that. The history department would have a file cabinet in which there would be hundreds of test questions on each topic and period. There would be so many of these questions, that no student if he obtained access to them could learn them without really learning the topic or period to which they referred. The teacher—or the clerk, if

experience and ability permitted—would make up the daily test from the accumulated materials, together with such new materials as seem justified. In some instances, the clerk might administer the test at the beginning of the class period. The clerk would rate the papers and upon a prepared double-entry form show the number of errors both by students and by questions. This report would go to the teacher for use in remedial instruction and in the distribution of emphasis in review.

For the realization of this plan a large department is not necessary. In smaller schools, two or three departments could combine in utilizing the services of a clerk. In still smaller schools a clerk might serve the whole school. Such an employee might be called an instructional clerk to indicate that the service had reference to the classroom rather than the office.

Many teachers will instinctively oppose this idea. They will feel that they need to go through the grind of rating papers in order that they may know "where the pupils are." We doubt if a teacher laboriously grading papers gets a very good notion of the needs of individual pupils. After spending an hour or two at this unutterable task, resilience is gone, one's senses are benumbed, and one receives no distinct impressions. One could get much more from a good tabulation.

And why not? The business man does not find it necessary to draw up his own payroll in order that he may know who is on his staff and what his overtime and absence amounts to. He doesn't find it advisable to make his own inventory in order that he may know what he has on hand. No manager of a factory makes out his own production sheets or time slips. These men depend on other persons to do this sort of work, and by consulting their reports, they reach many important decisions in the time it would take to make one decision if they had to do these things themselves. Why should teachers do otherwise? The dignity of the calling requires higher activities than those of clerical service. And now that the modern school is depending—as indeed it should and will continue increasingly to depend—upon record-making and testing it seems to us time to consider providing and utilizing expert clerical service. B. R. B.

Reviews and Abstracts

WODEHOUSE, HELEN. *A Survey of the History of Education.* London, Edward Arnold & Company, and New York, Longmans, Green & Company, 1924. 231 pp.

Miss Wodehouse's survey, although brief, is wide in scope. It ranges, after the fashion of H. G. Wells' *Outline of History*, from the dawn of life on this planet to the present, the year 1920. Without preface or introduction of any sort the work opens as follows:

> Life on this planet is believed to have begun many hundreds of millions of years ago. Much more than half that time was spent before certain creatures living in the water became fitted to spend part of their lives on land. . . . . Only in the final fragment of time, within the last thirty thousand or twenty thousand years, do we first find clear traces of men like ourselves.

Like Wells, too, the author constructs scales to aid us in placing our story and its several details in the right perspective against the background of these vast stretches of time:

> Let the whole period of life on the planet . . . . be represented by fifty years; then the life of human and sub-human races, from Pithecanthropus onwards, is contained in the last month of these fifty years. *The institutions of civilization are contained in the last eight hours.* Quintilian wrote less than two hours ago; Arnold worked in the last ten minutes.

In its general plan the work presents some striking irregularities. The story of education is divided into two parts: Part I, the history of the content of education; and Part II, the history of the extension or diffusion of education. The writer's sense of relative values seems at times to be at fault. While only nine or ten pages are devoted to each of such great periods as the later Middle Ages, the Renaissance in Italy, the Renaissance and Reformation in the North, four pages are given to the work of a relatively unimportant writer, John Brinsley, and three, to Charles Hoole. Twenty pages are assigned to Rousseau but the greater part of this space is taken up with passages from Wordsworth and Cowper illustrative of naturalistic tendencies of the time. These extracts and Miss Wodehouse's comments on them are interesting and illuminating, but they seem to have crowded from the book any reference to the pioneer experiments in the application of Rousselian doctrines in actual school work. No account is given of the educational views or activities of Basedow, Pestalozzi, Blasche, or Froebel. Their names are not even mentioned.

Part II, which treats of the extension of education and is entitled "Education for All," narrows down rapidly to a somewhat disproportionately detailed account of the development of the movement for universal education in England.

Part III, the concluding section, consists of "Reflections after Surveying Education" which well repays reading.

Notwithstanding this lack of proportion, of continuity, and of completeness the work is a valuable addition to the list of brief general surveys of the subject. Much of the charm of the work arises from the freshness and the originality of the points of view taken, of the data presented, and of the estimates made. In some instances, as in the sections on Quintilian, on Comenius, on Rousseau, or on the development of public education in England, the author derives her material from a direct study of original sources.

In her treatment of the Renaissance, Miss Wodehouse makes extensive use of the works of Castiglione and Elyot, writers hitherto too much neglected by those seeking to present the Renaissance point of view.

One of the most noteworthy features of the book is the section on Rousseau in the first half of chapter ten. Here the author presents an unusually illuminating, though brief, analysis and interpretation of Rousseau's views as set forth in the *Emile*, that baffling "collection of scatered thoughts and observations." The writer's impression, however, that "Rousseau looked into his own life and judges wrongly indeed but sincerely, how other boys must be guarded from growing to be men like himself" rather sharply conflicts with Lemaitre's conclusion that Rousseau is in the *Emile* urging upon others the kind of education that he himself had experienced, for "out of this education without family, or college, or teacher had issued that marvel of wisdom, of virtue, of sensibility, he himself, Jean Jacques." "De cette éducation sans famille, ni collège, ni precepteur, était sortie cette merveille de sagesse, de vertu, de sensibilité; lui, Jean Jacques." Jules Lemaître, *Jean Jacques Rousseau*. Paris, 1921.

The careless construction of the book is apparently concomitant with its chief merit, namely, that it represents a rather free reaction of a well-stored and vigorous mind to a review of the data of the subject.

L. T. Anderson

Ohio State University

Spain, Charles L. *The Platoon School*. New York, Macmillan Company, 1924. 256 pp.

As an introduction to his discussion of the platoon school Dr. Spain sketches briefly the evolution of the elementary curriculum from its European beginnings, through the Puritan period of the American Colonial schools, to the present conception of elementary education, and discusses the contributions to educational thought and procedure which have been made by Rousseau, Pestalozzi, Froebel, Herbart, Dewey, and, more recently, by Thorndike, Kilpatrick, Courtis, and Coursault. He points out certain advantages and disadvantages of the departmentalization which have come as the natural result of adding so many subjects to the curriculum.

The aims of the platoon schools, as set forth by Dr. Spain are: (1) "To provide an administrative device by which all of the subjects in the present-day curriculum may receive proper emphasis, and may be presented under conditions that best make for the realization of the social aims of education."

(2) "To develop an organization which shall not only effectively realize the ends of instruction, but which shall at the same time make the largest and the most effective use of the school plant."

Is the platoon school proving its worth by demonstrating that its educational product is superior to that of the time-honored school which it replaced? Dr. Spain proceeds to offer proof that the platoon school is proving its worth. Standard-test data, extending back over several years previous to the establishment of platoon schools in the city of Detroit are examined to show that although, during the early period of reorganization and readjustment, the efficiency of instruction in the platoon schools may have been for a time slightly reduced, nevertheless, after allowing a reasonable time for readjustment the efficiency of instruction in the platoon schools rapidly increased to a point where it was relatively higher than that of the city as a whole. He further shows that platoon schools have a lower percent of failure, a lower percent of retardation, and a higher degree of acceleration than in the non-platoon schools. The author does not claim that all this is due entirely to the difference in organization. The platoon schools are not favored, the author insists, either in the matter of nationality or in the superior ability of the children enrolled.

With reference to cost Dr. Spain presents figures to show that the per-capita building cost is lower in the platoon schools because of the fact that the capacity of a given school building is greater under the platoon than under the non-platoon type of organization, providing of course that such building contains the auditorium, the gymnasium, and the outdoor or indoor play space necessary for successful operation under the platoon system. Because of the fewer teachers required under this type of organization the instructional cost is likewise lower.

It is of interest to note that one out of every six cities of the country having a population of thirty thousand or more, has one or more schools conducted on this plan. In all, seventy-two cities maintain platoon schools. Of the large cities of the country, Detroit has eighty platoon schools; Philadelphia, forty-three; Pittsburgh, thirty-eight; Dallas, twenty-seven; Birmingham, twenty-three; St. Paul, eighteen; Newark and Akron, seventeen each; Sacramento, thirteen; Dayton, eight; and Rochester, six.

Dr. Spain has made an exceedingly valuable contribution to the cause of modern education. In the opinion of the reviewer, his book will prove of the utmost value to school authorities who may be considering the platoon type of organization.

J. P. O'HERN

Rochester, New York

PRATT, CAROLINE, ED. *Experimental Practice in the City and Country School.* New York, E. P. Dutton and Company, 1924. 302 pp.

This book is essentially a record, by Miss Lula E. Wright, of Group Seven (children of seven years of age) of the City and Country School, New York City, for the year 1922-23. The record is set down month by month and

is organized under the following captions: Play Experiences, Practical Experiences, Special Training, and Organization of Information.

Under Play Experiences are reported the activities connected with building a play city, with organized games and spontaneous play, and with their efforts at self-expression through drawing and painting. Practical Experiences include the work in sewing, cooking, clay modeling, and general shop practice. Special Training refers to the school arts, reading, language, writing, and number work. Organization of Information covers such things as discussions and stories, trips about the city, and science instruction.

The report has a very definite aim. This is made clear in an introductory "argument" by Miss Pratt wherein the history of the school is traced and its philosophy set forth. Dewey's doctrine that pupils must have a foundation of direct realization of situations before a superstructure of representative experience can be successfully erected has been accepted and built upon. Herein we find the key to the purpose and program of the City and Country School. It seeks to educate through natural and meaningful experiences of childhood. As Miss Pratt puts it, "There is no such thing as knowledge unrelated to experience."

The school is not interested primarily in instructing children in the school arts, but in bringing to them experiences that will help them to understand the world in which they live. Thus the work is likely to center about activities that possess an interest and meaning for childhood. In this case the building of a play city formed a central project extending through the year. Here was a common purpose requiring social adjustment and cooperation in its achievement. In laying out the city, need for a better acquaintance with the larger city lying round about was felt. So trips were taken to see its bridges, its buildings, and its mills. In connection with such excursions the children learned something of the world and received instruction in the school arts. The underlying theory is that a child should learn the things that he wants to know and needs to know, and not the things that an adult may need to know.

The whole work is frankly experimental. To one who is unwilling to admit the premise that the experience and needs of childhood afford the proper basis of education the present record is likely to have little appeal. To those who have accepted the doctrine set forth by Miss Pratt the work may well appear as a distinct contribution to educational practice.

The report is sufficiently detailed to give a good idea of the work and the method by which it was developed. But there are times when we do not see how seven-year-olds can secure such admirable results, with no more direct aid from the teacher than the record indicates. We should like to suggest that in some future report we be given something approaching a stenographic record of a type lesson or series of lessons, in order that any doubts on this score may be put at rest.

Speaking of future reports, may we not hope that Miss Pratt will give us, ere long, a record, similar to the present one, of the work of the "Tens" or "Elevens," where the problem is admittedly an even more difficult one and

where aid, such as we believe the City and Country School can give, is so badly needed.

VELORUS MARTZ

Indiana University

KOOS, LEONARD V. *The High-School Principal.* (Riverside Educational Monographs.) Boston, Houghton Mifflin Company, 1924. 121 pp.

In giving this book to the profession the author has not made an armchair contribution to educational literature, but has secured his facts through the cooperation of more than four hundred high-school principals in communities ranging in size from 1,000 to 100,000 population.

That his findings might represent a true picture of the principalship as it actually exists, the author secured returns from high schools ranging from 49 to 2,948 pupils located in the New England, Middle Atlantic, Southern, Central, and Western sections of the country.

The author lets the facts gathered speak for themselves and confines his efforts almost exclusively to the organization and brief interpretation of his findings. If he had so elected he could have expanded his material into a volume many times the size of this monograph which can be read at one sitting. The suggestive value of the book constitutes its chief contribution to educational literature. As a source-book of information on the *status quo* of the principalship as delimited by the scope of the inquiry, chapters II to IX should prove invaluable. Here the reader discovers a wealth of charts, graphs, and tables which, happily, are well-nigh mechanically perfect. The author also makes specific recommendations which in his opinion, must be met before "the high-school principalship can be classed with the indubitable professions."

The editor in his introduction says:

We know a great deal about the professional history, training, and effectiveness of the ordinary high-school teacher, but it is quite amazing to discover how little we know about the high-school executive. This gap in our knowledge is now filled. The careful researches of Professor Koos have told us what in fact the high-school principal is in all his general tendencies and variations.

This statement of the place which Professor Koos's volume occupies in the secondary field will be more amply justified as he subsequently supplements it with elaborations of the material at hand.

HARLAN C. KOCH

Ohio State University

STORMZAND, MARTIN J. *Progressive Methods of Teaching.* Boston, Houghton Mifflin Company, 1924. 375 pp.

A new book on methods of teaching can scarcely escape some difficulty in winning its way. This will be especially true in the case of the present volume, which essays the presentation of "all important general methods of instruction," and which endeavors to serve the interests of teachers on both the elementary- and secondary-school levels. Obviously such a book cannot be exhaustive. This one makes no such pretense, but is confessedly only an "intro-

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ductory treatment of teaching technique for normal students in schools and colleges," although the teacher in service has also been kept in mind.

The major part of the book, nine out of thirteen chapters, is devoted to the types of instruction. There is little real contribution in these chapters. Continuance of the inductive development "technique" is endorsed, despite the author's recognition of the fact that it rarely, if ever, occurs in isolation. A more worth-while discussion of thinking occurs in the chapter following the one on supervised study, but it appears in such condensed form that it may fail to make the impression that it should upon the reader. In discussing the problem-project idea the author, like many another before him, has felt called upon to draw a distinction which in itself is relatively unimportant. When we say that a project is a real-life activity, we are not distinguishing what a project is so much as pointing to a kind of project that is educationally important. The latter is eminently justifiable. Still more justifiable and necessary is it that we should show how sound thinking may be promoted in connection with the activity, whether we choose to call it a problem or a project. A distinct service is rendered in making more widely known these time-saving examination devices. It is a matter of regret that this has been done to the neglect of the general subject of questioning, which remains, for purposes other than testing, the feature in which the teacher's art attains its culmination.

The book is brought to its close in two relatively short chapters dealing with lesson-planning and individual instruction. Both will prove helpful to students of teaching, but neither is sufficiently elaborated to be most useful. The really crucial feature of lesson-planning, for instance, the finding and shaping of subject-matter so as to make it appropriate to pupils, is all but ignored. These two final chapters are notable examples of a defect which prevails pretty well throughout the book, and which may be said to be the result of an attempt to take in too much territory. The volume will be valued principally as a handy manual of general suggestions and useful expedients.

F. C. LANDSITTEL

Ohio State University

CLARK, ROSE B. *Unit Studies in Geography.* Yonkers-on-Hudson, New York, World Book Company, 1924. 250 pp.

In this book Miss Clark gives definite assistance to the geography teacher in the organization and presentation of forty large and fruitful "units" found in almost every course of study in geography. Nine of these units deal with "Home Geography"; eight, with the "World as a Whole"; and twenty-three, with "Continent Study." The studies as set forth do not call for repetition of topics at different points in the course. The first series of topics or units deals with the basic ideas of geography through a concrete study of units selected from the local environment. The second series deals with the lives of people living under varied environments in many parts of the earth. The third series provides a systematic treatment of topics in the regional study of the world.

A scheme of making specific use of the pictures in the textbook is developed. A valuable method of picture study is suggested in the presentation of the Central Plains of the United States.

"Reading the map" receives concrete treatment many times. The important things for pupils to interpret by map reading are set forth simply and clearly.

"Discovering interest centers" is a recurring topic in many units. Throughout the book "interest centers" growing out of the thought and the experience of the pupils are simply and clearly developed. These interest centers are then used as a basis for development by the class of important and far-reaching problems. These selected problems then constitute the basis for systematic development of the unit.

The book provides assistance to all teachers of geography whatever the textbook, the course of study, or the method of presentation desired. Specific references to the recent textbooks and to numerous supplementary readers and books guide the teacher and pupil to necessary material for each unit.

DOUGLASS C. RIDGLEY

Clark University

PECHSTEIN, L. A. AND MCGREGOR, A. L. *Psychology of the Junior High-School Pupil.* Boston, Houghton Mifflin Company, 1924. 280 pp. (Riverside Textbooks in Education.)

A study of this book will show that there are really two books—sections, they are called—under one cover and title.

Section I is a 150-page treatise by Dean Pechstein of the School of Education, University of Cincinnati, on the physical and mental behavior of adolescents. This section contains much interesting information in its twelve chapters, grouped under the headings "Growth," "Reaction," "Systematic Aspects," and "Personality." In general the statements are conservative and accurate; but they are frequently somewhat technical and as a rule without direct connection with the teaching process. For example we read "The autacoids of the parathyroid seem to prevent to some degree the overexertion or discharge of nerve cells and to exert some metabolic influence." (p. 20) With this and similar sentences the lay-reader may find considerable difficulty, but in the main this section (book) is *from the standpoint of the psychologist* an interesting and valuable collection of information regarding the physical and mental behavior of adolescents.

At the end of each chapter of this and the subsequent section there are questions which suggest the possibility in some instances of linking up the facts of psychology with those of good (empirical) school administration.

Section II of this book written by Miss McGregor, of the Washington Junior High School of Rochester, is a remarkably fine summary of the best practices in junior high-school administration. In its ten or more chapters it covers nearly all of the distinctive points of good junior high-school procedure though in a somewhat didactic manner because the wide range of topics covered does not, in the limitations of one hundred pages, permit much discus-

sion of the reasons underlying the various forms of worthy procedure that are recommended.

In some ten pages or more of the Introduction and in the closing chapter of Section II, an attempt is made to have it appear that each of the separate sections will become more intelligible if read in the light of the other. The fact is, however, that only a mind far above the average in information and training will be able to see any close relationship between these two quite separate and distinct contributions to junior high-school literature.

A reader of this book can scarcely help feeling that a textbook aiming "to show the biological and physiological foundations upon which the modern conception of the junior high-school is based" would have been surer of accomplishing its purpose if it had attempted to analyze actual school procedure in terms of the psychological principles involved. As it is, the book leaves to the normal-school teacher and student the task of establishing these specific, scientific connections between the facts of psychology and the practice of management which are in most instances as yet but dimly perceived even by the research specialist in secondary education.

JOSEPH K. VAN DENBURG

Board of Education, New York City

Publications Received for Review, April 15 to July 15

AMERICAN LIBRARY ASSOCIATION. Board of Education for Librarianship. *Annual Report.* Chicago, The Association, 1925. 44 pp.

BARNES, HARRY ELMER. *The New History and the Social Studies.* New York, The Century Company, 1925. 605 pp. $4.00.

BUSWELL, G. T. AND JUDD, C. H. *Summary of Educational Investigations Relating to Arithmetic.* Chicago, University of Chicago, 1925. 212 pp. (Supplementary Educational Monographs, No. 27). $1.50.

CLEVELAND, ELIZABETH. *Training the Toddler.* Philadelphia, J. B. Lippincott Company, 1925. 157 pp. $2.00.

COLEMAN, BESSIE BLACKSTONE, AND OTHERS. *The Pathway to Reading.* New York, Silver, Burdett and Company, 1925. Primer. 126 pp. $.68. First Reader. 126 pp. $.68.

COOLIDGE, CALVIN. *America's Need for Education and Other Educational Addresses.* Boston, Houghton Mifflin Company, 1925. 87 pp. $.80.

COX, PHILIP W. L. *Curriculum-Adjustment in the Secondary School.* Philadelphia, J. B. Lippincott Company, 1925. 306 pp. $2.10.

DUNBAR, ALDIS. *The Light Bearers, Stories of Old Greece.* Chicago, Beckley-Cardy Company, 1925. 194 pp. $.80.

FISH, CARL RUSSELL. *History of America.* New York, American Book Company, 1925. 629 pp.

FOWKLES, J. O. AND GOFF, G. T. *Fowlkes-Goff Practice Tests in Arithmetic for Grades 7, 8, and 9.* New York, Macmillan Company, 1925. unp.

FRYER, DOUGLAS. *Vocational Self-Guidance, Planning Your Life Work.* Philadelphia, J. B. Lippincott Company, 1925. 385 pp. $3.00.

GRAY, WILLIAM SCOTT. *Summary of Investigations Relating to Reading.* Chicago, University of Chicago, 1925. 275 pp. (Supplementary Educational Monographs, No. 28) $2.00.

HALL-QUEST, ALFRED LAWRENCE. *Professional Secondary Education in Teachers Colleges.* New York, Teachers College, Columbia University, 1925. 125 pp. (Teachers College, Columbia University. Contributions to Education, No. 169). Cloth, $1.50. Paper, $1.25.

HAZARD, HENRY B. AND MOORE, MARGARET D. *The Constitution at a Glance; Outline Analysis with Explanatory Notes.* Washington, The Author, 1925. 1 sheet. $.75.

HENDRICK, BURTON J. *The Life and Letters of Walter H. Page.* Garden City, N. Y., Doubleday, Page and Company, 1925. 349 pp. $1.00.

The Hour Cometh. Davenport, Iowa, W. N. Roundy, 1925. 64 pp.

JOHNSON, FRANKLIN W. *The Administration and Supervision of the High School.* Boston, Ginn and Company, 1925. 402 pp. $2.00.

KOOS, LEONARD V. *The Junior-College Movement.* Boston, Ginn and Company, 1925. 436 pp. $2.40.

LENNES AND MERRILL. *Cost Account, Book One, Blanks for Exercises in Part III to Accompany Farm Accounting.* New York, Macmillan Company, 1925. 51 pp.

LENNES AND MERRILL. *Cost Account, Book Two, Blanks for Laboratory Work in Part V to Accompany Farm Accounting.* New York, Macmillan Company, 1925. 96 pp.

LENNES AND MERRILL. *Financial Account Book to Accompany Farm Accounting.* New York, Macmillan Company, 1925. 64 pp.

LENNES AND MERRILL. *Inventory Account Book to Accompany Farm Accounting.* New York, Macmillan Company, 1925. 48 pp.

MARTIN, HERBERT. *Formative Factors in Character; a Psychological Study in the Moral Development of Childhood.* New York, Longmans, Green and Company, 1925. 346 pp. $1.40.

MEEK, LOIS HAYDEN. *A Study of Learning and Retention in Young Children.* New York, Teachers College, Columbia University, 1925. 96 pp. (Teachers College, Columbia University. Contributions to Education, No. 164). Cloth, $1.50. Paper, $1.25.

MELCHIOR, WILLIAM T. *Insuring Public School Property.* New York, Teachers College, Columbia University, 1925. 187 pp. (Teachers College, Columbia University. Contributions to Education, No. 168). Cloth, $1.50. Paper, $1.25.

MINER, JOHN RICE. *Tables of* $\sqrt{1-r^2}$ *and* $\sqrt{1-r^2}$ *for Use in Partial Correlation and in Trigonometry.* Baltimore, Johns Hopkins Press, 1922. 49 pp.

NATIONAL EDUCATION ASSOCIATION. Department of Elementary School Principals. *Fourth Yearbook.* Washington, The Author, 1925. 479 pp. (Bulletin, Vol. 4, No. 4. July, 1925). $1.50.

NOFFSINGER, JOHN SAMUEL. *A Program for Higher Education in the Church of the Brethren, with Special Reference to the Number and Distribution of Colleges.* New York, Teachers College, Columbia University, 1925. 80 pp. (Teachers College, Columbia University. Contributions to Education, No. 172). Cloth, $1.50. Paper, $1.25.

ODELL, C. W. *Educational Statistics.* New York, Century Company, 1925. 334 pp. (Century Education Series). $2.50.

PARKER, BERTHA M. AND COWLES, HENRY C. *The Book of Plants.* Boston, Houghton Mifflin Company, 1925. 252 pp.

PERRY, WINONA M. *A Study in the Psychology of Learning in Geometry.* New York, Teachers College, Columbia University, 1925. 59 pp. (Teachers College, Columbia University. Contributions to Education, No. 179). Cloth, $1.50. Paper, $1.25.

PILLSBURY, W. B. *Education as the Psychologist Sees It.* New York, Macmillan Company, 1925. 342 pp. $2.00.

PITTENGER, BENJAMIN FLOYD. *An Introduction to Public School Finance.* Boston, Houghton Mifflin Company, 1925. 372 pp. $2.00.

REEDER, WARD G. *Two Thousand Spelling Demons.* New York, Silver, Burdett and Company, 1925. 68 pp. $.72.

ROSS, EDWARD ALSWORTH. *Civic Sociology; a Textbook in Social and Civic Problems for Young Americans.* Yonkers-on-Hudson, N. Y., World Book Company, 1925. 365 pp. $1.80.

RUGG, HAROLD. *A Primer of Graphics and Statistics for Teachers.* Boston, Houghton Mifflin Company, 1925. 142 pp. $1.60.

SAMPLE, ANNA ELIZA. *Primary Games to Teach Phonetics.* Chicago, Beckley-Cardy Company, 1925. 96 pp. $.80.

SCOTT, GEORGE G. *The Science of Biology, an Introductory Study.* New York, Thomas Y. Crowell Company, 1925. 617 pp. $3.50.

SERVICE CITIZENS OF DELAWARE. *Delaware's Adventures in Citizenship.* Wilmington, Del., The Author, 1925. 45 pp.

STEFANSSON, VILHJALMUR, AND IRWIN, VIOLET. *Kak, The Copper Eskimo.* New York, Macmillan Company, 1925. 253 pp. $1.20.

THOMPSON, BLANCHE JENNINGS. *Silver Pennies: a Collection of Modern Poems for Boys and Girls.* New York, Macmillan Company, 1925. 138 pp. $.80.

TROW, WM. CLARK. *Scientific Method in Education.* Boston, Houghton Mifflin Company, 1925. 158 pp. (Riverside Educational Monographs). $1.20.

UHL, WILLIS L. *Principles of Secondary Education.* New York, Silver, Burdett and Company, 1925. 692 pp. $3.00.

WAITS, H. E. *Course in Phonics for Intermediate Grades, with Simplified Course in Phonics for Primary Grades.* Milwaukee, Wis., Bruce Publishing Company, 1925. 69 pp.

WALKER, ALBERTA, AND PARKMAN, MARY R. *The Study Readers.* New York, Charles E. Merrill Company, 1924-25. Fourth Reader. 310 pp. Fifth Reader. 320 pp. Sixth Reader. 326 pp.

WALLACE, H. A. AND SNEDECOR, G. W. *Correlation and Machine Calculation.* Ames, Iowa, Iowa State College of Agriculture and Mechanic Arts, 1925. 47 pp.

WINSLOW, C. A. AND WILLIAMSON, P. B. *The Laws of Health and How to Teach Them.* New York, Charles E. Merrill Company, 1925. 354 pp.

ZERBE, J. L. *Elements of Commercial English.* New York, American Book Company, 1924. 414 pp.

News Items and Communications

This department will contain news items regarding research workers and their activities. It will also serve as a clearing house for more formal communications on similar topics, preferably of not more than five hundred words. These communications will be printed over the signatures of the authors. Address all correspondence concerning this department to Doctor E. J. Ashbaugh, Ohio State University, Columbus, Ohio.

Dr. J. Crosby Chapman, associate professor of educational psychology at Yale University, was drowned near Chautauqua, on July 15. A further account of Dr. Chapman and his work will be found in next month's Journal.

Dr. H. L. Camp of the University of North Dakota has issued a three-page mimeographed report giving the "Legal Bases of School Finance in North Dakota." The items are briefed, and the page and section of the code references in which the legal statement may be found in detail are given in all cases.

J. A. Baer, assistant superintendent of Cuyahoga County, Ohio, recently used the Hotz Algebra Tests in the schools of that county (1) to reveal the general status and (2) to compare the achievement of pupils using junior high-school mathematics and those using the old-line algebra. The results indicate that there is but little difference, but what exists is in favor of the junior high-school mathematics.

The mimeographed bulletin on "Improvement in Reading, Spelling, and Arithmetic" of the Seattle public schools contains a large number of remedial suggestions. It is a matter of great interest and satisfaction to us to note that research workers not only try to reveal conditions, but to suggest methods by which these conditions may be improved.

A study of the transportation of pupils in Cuyahoga County, Ohio, shows for the year 1923-24 that 23 districts were transporting 3,124 pupils daily at an average cost of 13.6 cents, per day per pupil. The average for over four hundred thousand pupils in 22 states as reported in 1921-22 was 18.1 cents per pupil per day. The cost, of course, varied with the number of pupils transported, the wages of drivers, and the depreciation.

The Chamber of Commerce of Dubuque, Iowa, published and distributed a very attractive bulletin entitled *Educational Opportunities*. The business colleges, parochial schools, and public schools are all sketched, and the build-

ings and opportunities are illustrated by a large number of pictures. It is a type of publicity which would seem to be very well worth while.

Professor Fletcher Harper Swift, of the College of Education, University of Minnesota, has accepted an appointment in the School of Education at the University of California, Berkeley. During the present year Professor Swift, on leave of absence from the University of Minnesota, has been Visiting Professor in the Department of School Administration, Teachers College, Columbia University, and Lecturer in School Administration at the University of Pennsylvania. During the past summer Professor Swift offered courses in Educational Administration at the University of Utah, the University of California, and the University of Wyoming. He will return to Berkeley to take up his regular duties at the opening of the fall semester.

Dr. W. S. Monroe, director of the Bureau of Educational Research, University of Illinois, collaborating with Miss Nell B. Johnson, has published a pamphlet entitled *Reporting Educational Research* (University of Illinois Bulletin No. 25). Following an introductory chapter discussing the general nature of educational research, the chapters are on "Criteria for Judging 'Educational Writings,'" "Illustrations of Certain Details of Form," "Process of Writing a Report," and "Preparation of Manuscript for Printer." These titles are highly suggestive of the content, and graduate students in the field of education will find much that is helpful in this bulletin.

This past summer saw the creation of a school of religion at the University of Iowa. The various churches having adherence among the student body of the university are represented on the Board of Trustees together with a certain representation from the University itself. The school aims to give courses that will help students to gain a wholesome view of religion and to create an interest and efficiency in religious activities. It is a matter of great interest to all those interested in religious education to find Jews and Gentiles, Catholics and Protestants united in the great plan for the spiritual welfare of the student body.

The University of Iowa Extension Division published during April two bulletins in the College of Education series. These are the *School Census* (No. 11) by Dr. H. A. Greene of the staff, and *Administration of the School Budget* (No. 12), by C. P. Slater and H. A. Greene. The bulletins present the results of careful investigation in their respective fields. The one on the school budget presents a number of type budgets for schools of varying sizes and there are also tables which show the maximum, average, and minimum cost in dollars for the items in the various general items.

The following data from the annual report of the high schools of New Jersey may be of interest for comparative purposes:

On the basis of returns from 155 schools:

The median enrollment is 300.

The average salary of teachers is $1778.

The median teacher load in pupil-hours per week is 617.
The percent of teachers new to the position, 34.
The percent going to higher institutions, 48.
The percent persistent through four years, 47.

Fifty percent of the high-school pupils are enrolled in schools of over one thousand pupils each.

Seven percent are in schools of 200 or less, although 29 percent of the schools are of this size.

A Bureau of Experimental Education, in charge of Dr. Denton L. Geyer, was established last September at the Chicago Normal College. The work of the first year has included statistical analysis of the scores on intelligence tests given during the past five years to entering students, the development of objective examinations to replace essay examinations in the college, and experiments with two schemes for individual progress in the elementary school. The Courtis-Smith Picture-Story Reading Lessons and the Courtis Standard Practice Tests in Handwriting are being tried out in several Chicago schools under conditions allowing comparison with results in control rooms.

Mr. F. P. O'Brien, director of the Bureau of School Service, University of Kansas, made a study of the teachers' salaries in Kansas for the past year. The following table gives the median salary per month:

TEACHERS' MEDIAN SALARIES PER MONTH 1924-25

	Dollars
For nine months:	
Rural Schools	80
Elem. 3 Classes	100
Elem. 2 Classes	120
H. S., 3 Classes	160
H. S., 2 Classes	170
For ten months:	
H. S., 1 Class	190
Prin. H. S. 3 Classes	220
Prin. H. S. 2 Classes	230
Supt. 3 Classes	240

Principal H. D. Vincent of School 16, Troy, New York, reports a survey of his school in the following items:

1. Chronological age of pupil at date of examination.
2. Educational age of pupil determined by use of Stanford Achievement Tests.
3. Grade earned according to educational test.
4. Educational Quotient (item 2 divided by item 1).
5. Mental Age, result of Haggerty Intelligence Test.
6. Grade Equivalent of Mental Age.
7. Intelligence Quotient or I.Q (item 5 divided by item 1).
8. Accomplishment Quotient or effort (item 2 divided by item 5).
9. Teacher's estimate obtained from ranking process using educational tests as basis and ability of pupil to do school work.
10. Actual grade (average of educational test, mental test, and teacher's estimate).

As a whole it was found that pupils of this school compare very favorably with standards derived from many other schools. However, a great range of variability was found in each grade. It was largest in the highest grade tested and lowest in the third grade, the lowest tested. In certain classes the range was as much as six grades.

As a result of this survey the school has been regraded in such a way that the A and B classes within grades are fairly well balanced. This makes midyear promotions more practical than heretofore. Sectioning within each division was based on mental age.

As a result of the survey it was found that 10 percent of the pupils earned grades that warranted a special promotion. Such pupils were given the normal promotion plus one-half year. At present these pupils are leading their classmates in results. In two cases the I. Q. ran as high as 172, while about 10 percent failed to make a grade that warranted a promotion. So, by holding back those who failed to earn the required grade and by giving an extra promotion to the gifted pupils, the range of variability has been greatly reduced. In other words, the grouping became more nearly homogeneous and the teachers report more satisfactory conditions.